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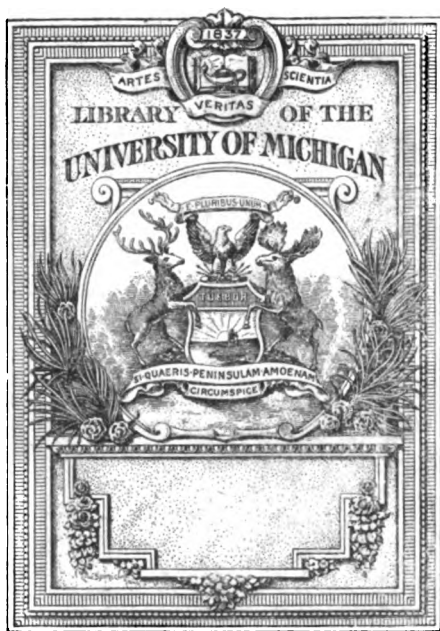
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*Archives of electrolology  
and radiology*

Chicago Electro-Medical Society



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# American Electro-Therapeutic And X-Ray Era.

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VOLUME III.

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January to December, 1903.

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F. W. BUTTERMANN, M. D., EDITOR.  
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## Original Contributions

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### THE X-RAY AS AN AID TO MEDICINE IN THE TREATMENT OF LUPUS AND CANCER.

J. E. GILMAN, M. D.

Whether the cause of cancer is or is not a specific germ, I believe the statement is safe that certain systemic conditions are found occurring either concomitant with or preceding cancerous lesions. Whenever the lymphatic circulation is sluggish the normal activity of the cells of any region of the body is apt to be impaired. Any one or more of the lymphatic glands may become engorged, giving rise to a slight amount of inflammation to its neighboring glands. This may produce a hardened lump, but give rise to no serious disturbance for many years.

Should a tubercle bacillus be carried to the gland, it might here find a quiet spot, somewhat cut off from the general circulation, because of the free establishment of collateral circulation around the engorged gland. The bacillus would multiply rapidly under favorable conditions. A tubercular gland would be the result. Now, while I have not satisfied myself as to a specific germ for cancers of all classes, I am certain that a sluggish action of the lymphatics makes very difficult any successful treatment of cancerous lesions if applied locally. I therefore use the X-ray as an aid to medicine. I wish to use the word medicine in its broadest sense, including surgical intervention when necessary; for I recommend operation very frequently in those cases where the lesion is rapidly growing, but is limited in its involvement of tissue.

The following cases are reported, illustrative of the treatment and its results:

CASE I.—*Internal carcinoma.* Mr. S., a grocer; treated first in Chicago and later in New York at the Gilman X-ray institute. Dr. Horton has kindly given the following details: Age of patient, 34; carcinoma of liver and bile ducts; diagnosis, microscopic, made in St. Barnabas Hospital, six months before he commenced treatment. He was operated on, Dr. Ell simply making an exploratory incision, which was immediately closed up and the patient's wife told that he would not live three months. In January he went to Chicago for X-ray treatment. He remained there two weeks, but could not remain longer on account of business, coming to me for treatment February 18th. At that time there was a tumor perceptible to touch through the abdomen, the size of my two fists, very hard and not movable. He was pale; looked as if he already had the cachexia, and I, of course, thought he would die. But he said he felt so much better than before going to Chicago that I decided to take him and he was treated daily for two months, at the end of which time the tumor had almost disappeared. He had very little pain. Subsequently, he was treated irregularly, averaging two treatments a week until August 1st, when I discharged him, as I had not been able to detect any tumor for a month, and he appeared well.

I think this case is the first one yet reported of internal cancer that has recovered after operation.

CASE II.—*Epithelioma of the face.* Mr. B., 56 years old; has had eczema 14 years; face covered with lupus vulgaris. About 18 months ago patient noticed a nodule the size of a buckshot on the left cheek. This developed an opening with erosion, swelling of the glands. It gave a profuse discharge. There were shooting, grasping pains through the cheek. The ulcer had deepened and had grown until its length was one and one-quarter inches by three-quarters of an inch in width. It had ragged, inflamed edges, with easily bleeding surface. A little touch would cause a bloody, watery exudate with slight amount of pus. The hemorrhages were very difficult to control and threatened life. The induration extends to the lower rim of the orbit, partly closing it, to the base of the nose and to the angle of the mouth, thus involving the

entire cheek. The eye was partly closed. The nodule in front of the ear is separated from the ulcer by an isthmus of normal tissue. The nodule crowds on the external meatus and interferes with hearing. General symptoms: Tongue coated; constipated; sleepless; nervous. Patient has been losing weight.

I sent the patient to Dr. W. A. Evans, of the Columbus Medical Laboratory, for microscopic section. The following is the report:

"Our sections show this to be a rapidly growing epithelioma. There is a great abundance of epithelial cells, some young and dividing, some older, some compression effects and arranged in circular lamellæ; some forming keratin pearls. The amount of cells is greatly in excess of the stroma. Among the epithelial cells and elsewhere are a great profusion of leucocytes, mostly polymorphonuclear neutrophils. There are many young blood vessels and there is considerable hemorrhagic extravasation."

The treatment began in May and continued until Sept. 13, 1902, when I sent the patient to Dr. Evans, who gave the following report:

"I have just examined Mr. B. with the following result: The skin shows a large scar on the left cheek. The ulcer has healed. The subcutaneous tissue is somewhat edematous but otherwise normal. So far as I can see there is no carcinoma in any of the structures of the face. The superficial lymphatics at the angle of the jaw are enlarged on each side. They are perhaps a trifle larger on the left than on the right side. He says that they are not enlarging, are not painful or tender. So far as I can see he is well of his epithelioma. Certainly so far as the face is concerned. I think more time should pass before we give an opinion as to the glands."

The patient returned to his home in Montana and has resumed his usual vocation.

Since then there has been no further recurrence. The general health of the patient is much improved. I have instructed the patient to report from time to time on the condition of the lymphatics at the angle of the jaw. Should there be any evidence of disease the treatment will be resumed at once.

CASE III. *Carcinoma of the pyloric orifice of the stomach.* Mrs. H., referred to me by W. R. Stewart, M. D., of Indian-

apolis, from whom I have the following notes:

"I was called first to see Mrs. H. May 11, 1902, and found her suffering with pain in the stomach, bloating in the stomach and bowels, with great tenderness in epigastric region. She also had persistent, violent vomiting. She was pale, her face wore an anxious expression, with dark circles under her eyes. Her breath was bad, tongue coated, a thick white coating, with great activity of the salivary glands. The bowels were constipated, and there was frequent eructations of gas which gave some relief.

"The vomiting did not cease entirely for about three days, and during its continuance no food was retained in the stomach, although soft or liquid food was taken.

"The epigastric region grew extremely sore to contact, so that the weight of the bedclothing could hardly be borne, and the entire abdominal region was so sore that anything like a careful examination was out of the question. On going into the case I found that she had been having similar attacks for eighteen months or more, only less severe than this one. They had the vomiting, the epigastric tenderness, and the bloating.

"After two weeks had elapsed the tenderness and tympanitis had subsided sufficiently to permit a more careful examination, which revealed a tumor in the region of the pylorus as large as the clenched fist and as hard as a baseball. It was only movable to a slight degree.

"My brothers, Drs. T. C. and W. B. Stewart, were taken into council, and a diagnosis of carcinoma of the region of the pyloric orifice of the stomach was made and she was advised to procure the X-ray treatment, which she did."

The patient came to me in the latter part of May. I made a diagnosis of carcinoma involving the liver, duodenum, pancreas and reaching to the stomach; tumor as large and as hard as a baseball; not movable. Patient hadn't been out of bed for three months. The complexion, pale straw-color; cachexia already developed; stomach test showed characteristic cancer reaction; gruel-like cancer vomiting with absence of HCL and excess of lactic acid.

After the first month of treatment with the X-ray and medicine she could ride about. The diminution in the size of the tumor was steady. It softened as it decreased in size.

The general systemic condition improved remarkably, the symptoms of cachexia gradually abating. In the latter part of September I sent her home, when all signs of the tumor had disappeared. I have received this subsequent report from Dr. W. R. Stewart, two months later :



CASE IV—Fig. 1.

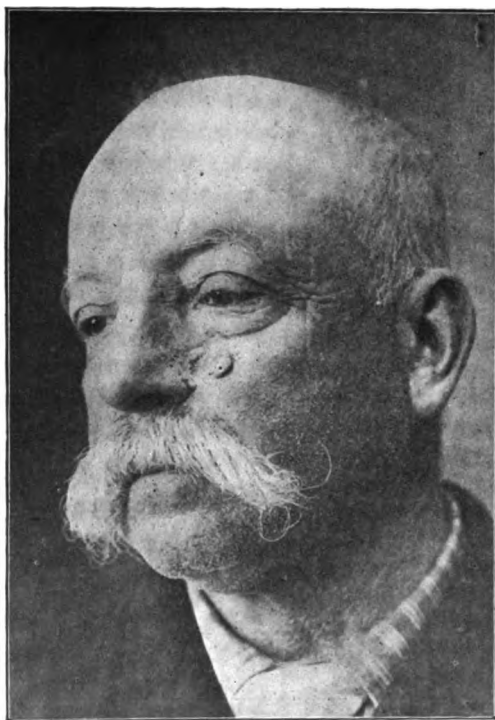
"Yours of recent date asking that I examine Mrs. H. and report her condition to you has been complied with, and I am very glad to say that after a thorough examination this morning I could find no tumor nor any trace of one. Her abdomen and epigastric region is as soft and pliable as anyone's and there is not the slightest trace of any of the old trouble. There is a little tenderness on firm pressure in the epigastric region, but perhaps no more than belongs to the average individual.



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She still has a slight exfoliation from the burning produced in the treatment and the abdominal surface remains much discolored. She still has a good deal of bloating and abdominal distention, which is much worse from any nervous excitement."

The nervous condition of the patient at the time of treatment was very serious. It is doubtful whether she will ever



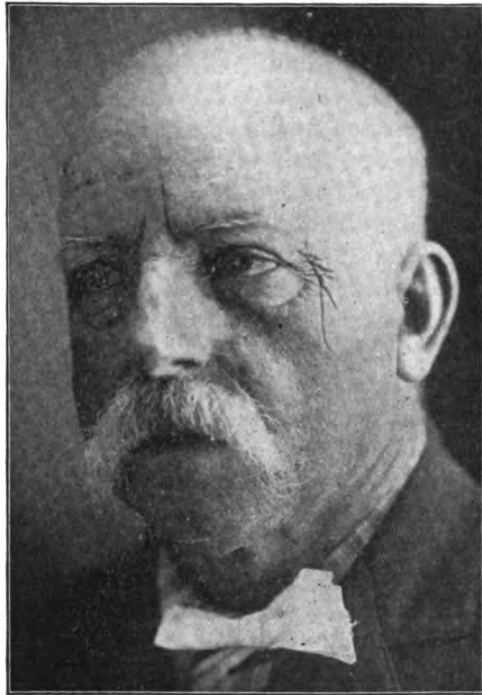
CASE IV—Fig. 2.

recover. I do not expect, however, any serious recurrence of the tumor because the patient would not neglect treatment at the first sign of growth because her treatment was not attended with pain.

The following case was treated by Dr. Horton, who gave me the following details:

CASE IV.—"Mr. I., aged 64. Microscopic diagnosis, scirrhous epithelioma of the left side of nose and cheek, of seven

years' standing. It was two inches by one and one-half inches, incrustated, and protruded from the face fully one-half an inch, making a very ugly-looking wound. He took treatment one month steadily every day, then every other day for another month. Recovery was complete—and thus far remains complete, as shown by the cuts." See Figures 1, 2 and 3.



CASE IV—Fig. 3.

CASE V.—Mr. C.; about a year and a half ago had a business strain which brought on an attack of neurasthenia. Late hours and overwork and overstrain caused a general breakdown, and obliged him to cease his avocation, and he took a trip to California for a rest. During this time indigestion, pain and other symptoms, such as heaviness and a feeling of weight in the stomach caused an aggravation, coming half way between meals, not felt when food first entered the stom-

ach. Pain passed off before eating again. Pain has continued in an increasing degree during the last six months. Pain sometimes ceases, then begins again; constipation. About three months ago had neuralgic pains, beginning in the abdomen, and lasting in the afternoon and the first part of the night. Pains very severe. There has been an inability to manage solid food; vomiting following the ingestion of food, but not immediately. Sometimes two or three days before the food would be ejected. Lying on the right side was more comfortable, but on the left side would start vomiting, when it was ready to come. Sometimes has been able to lie on either side, and would not cause vomiting for a long time when very careful to confine his diet to liquids. Has a good deal of flatulence, at times will vomit some mucus. The vomited material is a coffee-colored fluid; tongue somewhat red, slightly coated. The abdomen is sunken and the colon distended with feces. There are indurations of a nodular type to the right of the median line and the whole stomach has a gristly solidity, indicating the induration, which is in the upper part smooth and not nodular. Has lost flesh rapidly in the last three months and has been obliged to rely upon rectal feeding. An examination of the stomach contents was made by the bacterial branch of the Providential Board of Health at Winnipeg, with an absence of free HCl acid and the total acidity 30. Examination of the stomach here gave a similar report. Patient was unable to sit up from weakness and was under treatment from July 26th to August 26th, when he died from inanition, but during this time there was an absence of pain, a very rapid subsidence of pain after the use of the X-ray and ability to lie on either side and a rapid diminution of the induration, so that the month was one of freedom from suffering, where it had been constant, and no opiates were required to alleviate pain—a case apparently of progressive anaemia.

CASE VI.—Another case which illustrates the danger in these cases was that of a lady with scirrhus, recurrent after operation. This involved the whole of the thorax, externally; arm swollen and paralyzed, with large open ulcerations and extensive nodulations. This was one of the dry, hard, fibrous type, breaking down into open ulceration. In this instance the induration was very extensive. During the three months of

the treatment the ulcerations and the discharges lessened, but then developed the entire symptomatology of typhoid fever. Every clinical symptom was present of the disease, the rhythmical rise in temperature, the rose-colored spots in the abdomen, the iliac tenderness, and the typhoid tongue, and the gradual aggravation and diminution of the temperature, following out a typical case of typhoid. An examination of the blood was negative of the typhoid reaction, but the Diazi test of urine was positive, and the patient succumbed during the fourth week from exhaustion and hypostatic congestion of the lungs, somewhat unexpectedly. In this case undoubtedly septic absorption had much to do with the fatal result. I am satisfied that the difficulty of the excretion of the sewage of the body is the cause of death in some of these advanced cases, and the rapid depuration of the blood from the septic matter carried away from the cancer, for the purpose of excretion, is a cause of death, unless exceedingly carefully watched, and even then in cases it is a matter of extreme difficulty to avoid auto-infection. The lowered vitality, the impoverishment of the blood, the exhaustion of nerve force are difficult features to combat. I think that in many instances of these severer types a surgical removal of some of the depraved tissue might relieve the system of a certain portion of these dangers.

#### COMMENTS

I have purposely added this last case because it illustrates the limits of the treatment. The X-ray will not cure every case of cancer. I have accepted a number of cases for treatment that I was sure could not be permanently benefited. I have felt, however, that much of their pain was relieved.

With respect to my prognosis, I divide all cancers into four classes.

In the first class I include all the nodules, indurations and engorgements which so often precede malignant growths, external and internal; the slow-growing forms, even when of considerable extent, and of considerable duration, and the more easily reached external invasions, such as the superficial carcinomas. I feel sure this class will be cured.

In the second class I place growths that have made so much progress that general infection is impending, but has not yet taken place, and no metastases to other internal vital organs,

although the invasion of the cancer may be very considerable in extent, and increasing. No positive prognosis can be made until after some weeks of treatment. Many of these cases succumb; a large number improve.

In the third class I place the cases that are almost moribund; those cases where recurrence after operation has resulted and general septicaemia is imminent; and also the patients in a similar systemic condition whose cancers have been treated with the various kinds of paste or salve which, though eating out the tumor, only too often markedly increase the rapidity of the growths. I regard these latter as perhaps the least answerable to treatment. The X-rays may even fail to relieve their suffering.

In the fourth class I place all rapidly growing lesions that are as yet circumscribed, such as the large cell sarcomas and the encaphaloid epithelioma. I recommend surgical intervention to be followed immediately by X-ray treatment. It is not essential that the incision be entirely healed, because the X-ray promotes the activity of normal cells. I expect these cases to get well, for even in those where cancerous tissue has recurred and grown rapidly in the yet unhealed incision the X-ray has caused this tissue to speedily disappear.

#### TECHNIQUE.

I do not personally give X-ray treatments, but refer my patients to experts who administer the rays to produce the results I indicate. The patient reports to me each week, or more frequently if needed.

I think the best results are obtained in the use of the X-ray when the diseased tissues are brought to the point of local reaction without producing a necrotic burn. The physiological effect of the X-ray upon the skin is very similar to that of the intense sunlight, with the difference, of course, that exposure to sunlight brings on dermatitis almost immediately. Some patients are "sunburned" easily by the X-ray, others are tanned, becoming a brownish-black. These can be treated with more intense irradiation. Superficial lesions are treated with a low tube two or three times per week, while internal cancers are treated with a high tube.

I believe a most important part of the treatment is the administration of medicine. I use the proper remedies to stimu-

late the activity of the lymphatics and the lymphatic glands; to remove congestion; to stimulate activity of the digestive organs. For I hold that the disintegration of cancerous tissue by the X-ray forces upon the system a most serious task in elimination. Case 6 was one in which this task was too great for the enfeebled state of the patient and a speedy end by sepsis resulted.

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ABSTRACTS OF PAPERS READ AT THE MEETINGS  
OF THE AMERICAN ROENTGEN RAY SOCIETY,  
AND DISCUSSIONS.

EQUAL POTENTIAL SURFACES IN X-RAY FIELD

was the title of a paper contributed by Dr. John C. Pitkin, of Buffalo, N. Y. The author considered the construction and comparative value of X-ray generators. He prefers the static machine to the coil because the discharge is more uniform, direct and continuous, and we get a primary current. It also is an ever-ready source of electricity. In taking up the question of a di-electric, the author exhibited an apparatus of his invention designed upon the principle that many small air gaps in simple series are superior to one long interval. His apparatus consists of a glass rod about twelve inches in length and three-quarters of an inch in thickness, which projects horizontally outward and forward from the arm of the positive prime conductor, between the great ball and the handle of the discharging rod. On this rod are slipped several plain brass band rings which are freely movable to form intervening air gaps. In this way the X-ray is greatly intensified. This spark gap multiplex is especially adapted to use with low vacuum tubes.

Dr. Gordon C. Burdick, Chicago, prefers the coil to the static machine because it has more energy and it gives a better photo-chemical light. A radiograph can be made in less time than with the static machine.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Iowa, said that the principal part of an electrical apparatus used for X-ray work is the tube and not the source of the electricity.

Dr. H. E. Waite and Dr. T. P. Hall also participated in the discussion.

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PRESIDENTIAL ADDRESS.

Dr. Girdwood chose for his subject the origin of electricity, its gradual growth and development and its application in medicine. The derivation of the various electrical terms was given, the progress of the science of electricity from the time of the early Greeks up to the present day, and finally the discovery of the Roentgen Ray in 1896. The fluoroscope, the skiagraph, the radiograph and all the electrical appliances used, either for purposes of diagnosis or therapeutically, were described in detail. In this connection the president called attention to the fact that inasmuch as it has been customary in electrical circles to honor the inventor by bestowing his name on his invention, we should always refer to the X-radiance not as the X-ray, but as the Roentgen Ray. The nature of the ray was also discussed and in conclusion the president exhibited a number of skiagraphs made by him many years ago when the apparatus was imperfect and when the work in this field was largely a matter of experiment.

SYSTEMATIC RECORDS; THE ROUTINE USE OF THE X-RAYS.

Mr. W. J. Wilbert, of Philadelphia, Pa., detailed the method in which the records are kept in the hospital with which he is connected. Formerly all records were kept on cards specially provided for that purpose, but it was found necessary to abandon that system because the cards were lost both by the patient and the physicians, and they are neither as practical nor convenient as the book record, which is now in use. It is impossible to lose a record, as it cannot be removed from the book and the attending men cannot put a book into their pocket and then forget it, as is the case with a small card. Letters, numbers and cabalistic signs are used to indicate findings, etc., in this book and as these are intelligible to the hospital attaches only, they are useless to any one else. The book is fully indexed.

Attention was called to the value of the routine use of the X-ray, particularly in hospital work. Every obscure case and every case of fracture or supposed fracture should be radiographed. Oftentimes it is impossible to make a diagnosis in any other way than by the use of the X-ray. He cited a case of fracture of the fifth metacarpal, and another of fracture of three metacarpals in which a diagnosis of sprain had been made. The X-ray disclosed the fracture. Two cases, which had been diagnosed by the surgeon as cases of osteosarcoma, were on examination found to be fractures of the ulna above the joint without the existence of any deformity. Another case complained of a painful elbow due to a fall. The examination was negative, but the X-ray showed a fracture of the olecranon without deformity or separation. A diagnosis of rheumatism is frequently made when some of the joints of the hand or foot are involved, and yet, on examination with the ray it is found to be a case of fracture. A supposed case of fracture of the outer condyle of the humerus was found to be a luxation with fracture of the head of the radius. In cases of fracture in the joint it is advisable to take a front and side view in order to make a positive diagnosis.

It is also of value in diseases of bone. A child was brought to the hospital with hip joint disease. The radiograph showed a normal joint, but there was a beginning tuberculosis in the lower end of the fibula and tibia. Another case of hip joint disease was in reality one of simple luxation of the head of the femur and a separation through the acetabulum.

Dr. J. N. Scott, of Kansas City, Mo., emphasized the necessity of making a radiograph of each case instead of attempting to make a diagnosis with the fluoroscope.

Dr. G. P. Girdwood, of Montreal, Can., cited a case where the fluoroscope showed a normal picture. The radiograph, however, distinctly showed a longitudinal fracture of the external malleolus of the ankle joint, without any evidence of either a deformity or a separation.

Dr. W. C. Borden, Surgeon Major, U. S. A., Washington, D. C., said that many cases of so-called sprain, especially of the knee joint, are incorrectly diagnosed. He cited two cases so diagnosed in which the X-ray disclosed a fracture, one which could not be diagnosed in any other way. One of the cases came to the hospital nine weeks after an injury received while



at drill. There was no crepitus, but little swelling, and no displacement. A radiograph was made which showed that the inner condyle of the femur was split off entirely up to the intercondyloid notch, but with no displacement. The man had been walking without a cane, supporting the whole weight of his body on the outer condyle. The second case was seen six weeks after injury. The inner tuberosity of the tibia was completely split off. The diagnosis in both cases could not have been made without the X-ray.

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#### SKIAGRAPHY AS AN ART.

Read by Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia. This was largely a discussion of the method of making a skiagraph. Among other things the author advised that we never expose more tissue to the rays than is necessary in any case, and that the rays be concentrated at the point desired. Overillumination must be avoided, as well as over- or under exposure. A good skiagraph can only be made by one with sufficient experience and the expert alone is able to read correctly the shadows on the plate. He will find things that are not visible to the ordinary operator. In closing he detailed his method of making instantaneous skiagraphs and exhibited numerous negatives showing the results of his work. Positives, he said, are never so satisfactory as negatives.

The discussion on this paper, which was participated in by Drs. Hetherington, Burdick, Johnson, was in general a protest against too rapid work, so-called instantaneous exposures, as advocated by the author.

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#### TREATMENT OF THREE CASES OF CANCER, ONE OF TUBERCULOSIS AND SEVEN CASES OF RODENT ULCER AND LUPUS.

Contributed by Dr. G. P. Girdwood, of Montreal, Can.

The author stated that in one of the cases of cancer of the breast all the symptoms disappeared rapidly under treatment with the X-ray. The tumor mass was replaced by a very soft, pliable tissue and a good cicatrix. Although the condition of the patient was very much improved, he does not believe that a recurrence of the tumor is at all improbable. Lupus and rodent ulcer yield very quickly to the X-ray and apparently

the result obtained is a lasting one. He exhibited a number of photos and skiagraphs illustrating the condition of the patient before treatment, at different stages during the treatment, and the final result. In some of the cases the results were exceptionally good so far as the cosmetic result was concerned.

Dr. J. D. Gibson, of Birmingham, Ala., emphasized the value of the test-tube electrode in treating acute eczema or a very tender lupus or ulcer.

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THE TECHNIQUE OF THE TREATMENT OF MALIGNANT GROWTHS, contributed by Dr. J. N. Scott, of Kansas City, Mo. The author said that the apparatus used in this work should be powerful enough to excite the largest tube to its fullest capacity with a full control of the current. He never applied the ray strong enough to produce necrosis, as this is exceedingly liable to stimulate the growth of that part of the tumor which has not as yet been brought under the influence of the ray. When cases of cancer are treated every day the results are much better than when there is too long an interval between the treatments. The first exposure should not exceed four minutes; this is gradually increased to eight until a reaction appears, when the time and length of exposure are again reduced. The growth is exposed from as many directions as possible in order to bring every portion of it under the influence of the ray. The general condition of the patient must also be watched and all his eliminative functions kept active. The X-ray will cure a certain per cent. of cases and improve nearly all of them more or less. It is far superior to the knife in that the original tumor as well as the metastases can be treated at the same time, thus preventing any further spreading and limiting the local growth. It is also applicable where the knife cannot be used. He prefers to have the bad cases operated on and then brought to the X-ray worker for further treatment. The result is better than when either method is used alone.

The author described a box which he invented in order to prevent burns of unaffected parts of the body and also for the protection of the operator. It consists of a large box which is suspended from the ceiling. The tube is placed within this

box and the rays pass out through an opening in the side of the box. The size of the opening can be regulated by shutters.

Dr. A. M. Phelps, of Battle Creek, Mich., suggested that instead of removing the tumor with the knife and then follow with the X-ray, that the tumor be removed with the cautery knife, as suggested by the late Dr. Byrne, of Brooklyn. It would effectually check any tendency to the formation of metastases and would not interfere with the subsequent use of the X-ray.

Dr. Gordon G. Burdick said that in treating a carcinoma with the X-ray it is not necessary to protect the healthy tissue except when located on the face. It checks the formation of metastases and besides the tumor tissue will break down long before the healthy tissue can be affected.

Dr. Lester E. Custer, of Dayton, Ohio, exhibited an adjustable screen, having a central opening through which the rays can pass without coming in contact with healthy tissue.

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#### RADIO-THERAPY IN PULMONARY TUBERCULOSIS.

Dr. Gordon G. Burdick, of Chicago, read this paper. In a series of extensive experiments carried out under his direction he found that while it is possible to inhibit the growth of bacteria, and especially the tubercle bacillus, with the X-ray, it is impossible to kill it. All the cases of pulmonary tuberculosis treated by him have improved from the beginning of the treatment and eventually made a good recovery. That is, there was a cessation of the cough, temperature, night sweats and diarrhea, and a steady return of weight and strength. There has not been any recurrence of the trouble, although in a number of the cases tubercle bacilli have been found in the sputum raised on arising in the morning. Hemorrhages are always promptly controlled. Cases of fibroid tuberculosis yield very slowly to treatment. The consolidated areas in the lung clear up to a very great extent. Abdominal tuberculosis requires more prolonged treatment. In chronic tuberculosis there is a disappearance of the symptoms, but improvement in weight is slow. The same is true of the mixed infections, in which there is in addition a great tendency to the development of toxemia. Joint tuberculosis, involving only the bones, offers the best results. Permanent relief cannot be obtained

until complete ankylosis has occurred, and the X-ray should not be used in these cases until ankylosis is complete. The results obtained by the author in 43 cases of tuberculosis in all parts of the body were very good. Only one of the cases died, a case of advanced general tuberculosis. It is by no means an exclusive method of treatment in pulmonary tuberculosis, but should be looked upon as a useful adjuvant. While good results have followed the use of the ray, it is impossible to report absolute cures.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia., has treated twenty cases of pulmonary tuberculosis with the X-ray. Sixteen of these cases were considerably improved and four were completely cured, and have remained so for six years. In tuberculosis of joints his results have also been good, but he cautioned against the idiosyncrasy of the patient to the X-ray. In glandular tuberculosis the results have been less promising. Recurrence nearly always takes place.

Dr. Kennon Dunham, of Cincinnati, Ohio, said that he had found that the X-ray does not affect the tubercle bacillus to any appreciable extent. He believes that the favorable results obtained by treating tubercular patients is not due to a destruction of the bacillus, but to the stimulation of the tissues. He has obtained good results by simply wrapping the patient in a coil of copper wire, which is connected with one pole of a high frequency current.

Dr. Russell H. Boggs, of Pittsburg, Pa., cited six cases of tuberculosis treated by him with the X-ray. One of the cases has remained cured for over a year. One case died from some intercurrent affection and the other four are decidedly improved in every way.

Dr. Emil H. Grubbe, of Chicago, does not believe that tuberculosis is ever cured by the X-ray. They are merely improved and will die of tuberculosis sooner or later. He decried bacteriological work by the X-ray worker and said that we place too much stress on it.

Dr. J. D. Gibson, Birmingham, Ala., cited a case of tuberculosis complicated by a very large cirrhotic liver. After six weeks' treatment all the symptoms, except those referable to the alimentary canal, were markedly improved. The treatment was discontinued, the patient went home and died. He be-

believes that in the X-ray we have a most efficient and important means in the treatment of tuberculosis. While it does not cure, yet it improves every case, even the most desperate and hopeless. In cases of mixed infection, packing of the patient is a valuable adjunct to the ray. The packing must be done carefully, however, as it may otherwise prove harmful.

Dr. James B. Bullitt, of Louisville, Ky., advocated expansion by the X-ray worker in other departments of medicine, and especially in bacteriology, as that is such an important factor in the production of disease.

Dr. Hare took the same stand.

Dr. Phillips, of Cincinnati, O., in treating tuberculosis of joints makes use of a static cataphoresis instrument, using such remedies as creosote and formaldehyde. His results are better than when the ray alone is used. One case of tuberculosis of the knee joint was treated for eight months when all the symptoms had subsided and the joint was freely movable. He is now using cataphoresis in treating pulmonary tuberculosis, but is not ready to report as to the results obtained.

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X-RAY TREATMENT IN INTRA-ABDOMINAL AND OTHER DEEPLY LOCATED MALIGNANT GROWTHS.

*Contributed by Dr. Clarence E. Skinner, of New Haven, Conn.*

The doctor said that the effect of the X-light on cancer was due entirely to its specific influence on the tissues. He reported 38 cases in which the treatment had been used. The result was as follows: There was a complete disappearance of the disease in three cases; a continuous reduction in the size of the tumor in 15; temporary reduction with subsequent increase, ultimately resulting fatally, in one; complete apparent arrest in four; no effect demonstrable in the size of the tumor in 15. Complete permanent relief of pain in 16; complete temporary relief in three; partial in eight; no relief in four, and in seven there was no pain. The general condition of the patient was improved in 14; temporarily in eight; no influence apparent in nine, and in seven the general condition was not noticeably impaired when the patient applied for treatment. There was a gain in weight in six; no apparent change in 32.

Hemorrhage was lessened in nine; not influenced in two, and no hemorrhage observed in 27. Toxemia of varying degree in 15 cases. In five cases there was no evidence of any benefit, and three of these cases discontinued treatment after two or three treatments. So that out of a total of 38 cases there are three apparent cures; 17 continuously benefited, and they are still improving with prospects of an ultimate cure; 13 temporarily benefited; in two no benefit, and in three the treatment was discontinued by the patient without regard to the results of the treatments already given. Every one of the cases treated was considered inoperable because of advanced disease and offered a hopeless prognosis by any other method of treatment.

#### CONCLUSIONS.

1. The pain of deeply seated cancers is removable by the X-light from slight amelioration to complete disappearance.
2. In many cases the X-light is capable of exercising an influence on deeply seated cancers of sufficient intensity to remarkably retard the disease and thus prolong life.
3. In a certain proportion of cases it possesses the power to entirely overcome deeply seated malignant processes.
4. A small number of deeply seated processes exhibit absolutely no indication of being susceptible to the X-ray.
5. Phenomena indicative of toxemia not infrequently accompany the treatment of malignant diseases by the X-ray. This is due to the elaboration of toxic substances owing to the retrograde metamorphosis of the tissues which are insusceptible of regeneration.

The treatments were given three times a week, from three to five minutes each time, taking into consideration the condition of the patient, the apparatus and the results obtained from the treatment.

Dr. James P. Marsh, of Troy, N. Y., cited a case of a woman, age 55, who was referred to him for hysterectomy because of an extensive carcinoma of the cervix with all the characteristic symptoms. He treated her with the X-ray, applying the ray alternately over the suprapubic region and per vagina, using a very soft tube. The treatment was given for ten minutes. After about twenty or thirty treatments there was

a considerable improvement in her condition. All the symptoms had disappeared, she was feeling well and gaining in weight.

Dr. J. Rawson Pennington, of Chicago, said that in his opinion the best results thus far in the use of the X-ray have been obtained in the treatment of superficial conditions or those which are readily accessible. The reason is that the ray cannot be brought to bear directly on all the portions of a deeply seated lesion or tumor, and hence the results are not as good as in the treatment of superficial lesions. To overcome this difficulty he has designed a shield for the tube consisting of two hemispheres so constructed that they can be clasped together over the tube. These hemispheres are made of brass which is of sufficient thickness to protect the healthy tissues from the action of the X-ray. The hemisphere opposite the target of the tube has a large opening through which the rays act. Around this opening is placed a strong flange for the purpose of holding firmly any style and diameter of speculum that may have to be used in the individual case. This instrument can be manipulated so that the rays can be directed to any part of the growth. The operator has complete control of the tube and the maximum of X-radiance is always at the end of the speculum, no matter in which direction it is pointing; there is no danger of burning the patient. He uses a high tube excited by the static machine.

Dr. Scott, of Kansas City, Mo., prefers to have these cases of cancer operated on first and then to subject them to treatment with the X-ray. A moderate use of the ray hastens the healing process considerably. Hemorrhage will stop in a great measure, and in some cases entirely, after treatment with the ray. A current of sufficient intensity should be used to penetrate the parts; the greater the volume of the current, the greater the effect on the tissue exposed.

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Dr. Wm. Jordan Taylor, of Cincinnati, O., read a paper detailing the unexpected explosion of an X-ray tube in his laboratory while the tube was not in use and had not been for fifteen hours. It was not connected with any apparatus and there was no apparent reason for such an explosion of such force as he witnessed.

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## Editorial.

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We have adopted the magazine form for our journal because of its more convenient size. The time is most opportune, namely, at the beginning of a new volume. We mean that the improvement in form shall also be equalled by the excellence of the articles.

Our pages are for our readers. We are not trying to advocate any mode of treating disease, but we wish to give the everyday experience of the workers in the field of Electro Therapy.

We shall keep our readers informed of the work reported in foreign journals as well as in those of America.

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### NOTICE.

The January meeting of the Chicago Electro-Medical Society will be held in Room 301, Schiller Building, January 27th, at 8 o'clock p. m.

Dr. M. C. Rice will read a paper on the treatment of Constipation by Electricity.

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### SECRETARY'S REPORT OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

The regular meeting of the society was held in Room 301 Schiller Building on Tuesday, December 30th, 1902.

In the absence of Dr. Burdick, Dr. Grubbe occupied the chair. The minutes of the November meeting were read and approved.

The name of Dr. W. C. Egelhoff was reported by the Directors as elected to membership.

Under the head of miscellaneous business there was a discussion on the relation of the society to certain individuals who are questioning its legality of incorporation. The opinion was expressed unanimously to let the law take its course.

Reading of the paper on "The Cathode Rays," by Mr. Treadwell. The paper was discussed by Drs. Coleman, Marks, Decker, Mr. Friedlander and Dr. Grubbe.

Society then adjourned.



## THE CATHODE RAYS.

C. H. TREADWELL, B. S.

Paper read before the Electro-Medical Society,  
December 30, 1902.

From the standpoint of physics the Cathode Rays present much more interesting properties than do the X-rays although physicians are of necessity much more interested in the latter. This is because of the Therapeutic and Radiographic powers of the ray which lie outside the domain of physics.

It is possible that we shall later on discover new properties of the X-rays, but at present all our efforts seem to prove that they cannot be reflected, refracted or polarized. We cannot, therefore, be at all sure that they are a radiation similar to that of light although some scientists have made such a statement.

With the Cathode Ray, however, we have been able to discover many of its properties, and I wish to direct attention to the researches that have been carried on by which these properties have been discovered.

Very often progress in scientific research is dependent upon mechanical improvements and in no line of investigation was this more true than in discharges of electricity through rarefied gases. It was about the middle of the last century that Geissler perfected an air pump, with which the gas in a tube could be rarefied to about the one-thousandth of an atmosphere. The result was the manufacture of the Geissler Tube, which led to a great improvement in the art of glass blowing. With these tubes scientists soon knew the phenomena of the Geissler discharge. Some 10 years after this the Mercury Air Pump was fully perfected with which could be obtained a vacuum of the one-millionth of an atmosphere; only at such a vacuum as this could the Cathode Rays be obtained. Plücker first called attention to the fluorescence produced by the Cathode Ray. Hittorf, his pupil, discovered that the Rays cast a shadow.

The earliest scientist to thoroughly investigate these phenomena was Sir Wm. Crookes, who has lately been the president of the British Association for the Advancement of Science.

His results soon led him to consider that the matter contained in a vacuum tube was in a peculiar state different from that under ordinary conditions. To get his point of view a few words of explanation are needed.

The molecules in a solid body are conceived to be held in such close relation to each other, that very little vibration is permitted. When the body is heated, the molecules are conceived to vibrate more freely, but they do not change their relations in the body. In a liquid body, the molecules are more free. They can wander about from one part of the liquid to another, as is readily evinced when a small flame is placed beneath a glass vessel containing water. That part of the water nearer the flame rises and the colder water settles to take its place, thus forming convection currents. The molecules of a gas are considered even more free than those of a liquid. The pressure which the gas makes upon the walls of a glass tube is held to be the result of continuous collisions of the particles of the gas with the walls of the tube. These particles rebound and collide with each other in a perfectly hap-hazard sort of way. They travel at very great velocities but only over an exceedingly small distance, called the free path. It is conceived that collision might take place in longer flight in some cases than in others, but there must be an average or mean free path which depends upon the number of particles of the gas in the tube. The velocity of the particles depends upon the temperature of the gas. When the pressure was reduced to the one-millionth of an atmosphere the mean free path was considerably lengthened and became great enough under certain circumstances to be a large fraction of an inch.

This is illustrated by a vacuum tube, Fig. 1. The electrodes at the ends are connected to the positive electrode of the coil and the one in the center is a flat disk connected with the negative. When the tube is at a high vacuum a dark space extends for about an inch to the right and left of the cathode. This space is bounded by a very light region. The dark space marks the region where the particles do not collide with each other or with the walls of the tube. The light regions are where the collisions occur. When the vacuum is low the dark space is very narrow.

Sir Wm. Crookes found that when a radiometer (a light wind-mill capable of rotating in horizontal plane with the corresponding side of each arm provided with a small piece of black mica, a good absorber of heat, and the other arm with a good reflector)—he found with such an instrument, I say, that direct sun-light would cause its rapid rotation in a tube with high vacuum, but at ordinary pressures no such rotation could be produced. He considered that this proved a new

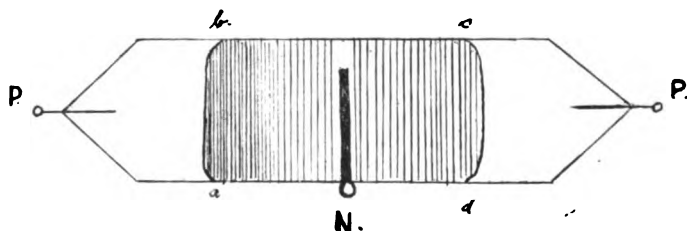


Fig. 1.

property existing in rarefied gas which led him to say that matter might be in a fourth state, as he called it, "Radiant Matter." This new property results because the mean free path of the molecules has been considerably lengthened. The speed of the molecules near the absorber in the radiometer rebound very much more vigorously than do those near the reflecting surface. This rebound sends the arms of the wind-mill in the opposite direction, but at the ordinary atmospheric pressure the radiometer does not revolve because the molecules on both sides of the arm are so densely packed that the increased pressure is at once divided between both sides. As is well known, Sir William Crookes did not halt with the observation on the radiometer, but he tried this higher vacuum for its electric properties.

The so-called Crookes Tube of to-day, that is, the X-ray Tube, is of an entirely different shape from that he used. His tubes were either cylindrical or pear shaped and his cathode was not concave, but flat. It had always been supposed that the electric current proceeded from positive to negative, but it was here found that a very evident discharge proceeded from the cathode, and Crookes gave to this discharge the name, "The Cathode Rays." He entered upon an investigation of considerable extent, discovering among

other things that the cathode rays always proceed in a straight line from the cathode, hitting the walls of the tube directly in front of it and causing them to fluoresce. If any solid body was placed in the path of this discharge, its shadow was cast upon the walls of the tube. A familiar illustration to this is his tube containing a Maltese Cross of aluminum, which could be made, by suitable inclination of the tube, to stand erect in front of the cathode so as to stop the rays and cast its shadow on the walls of the tube, or lie flat, thus allowing the passage of the rays. See Fig. 2. It was also discovered that

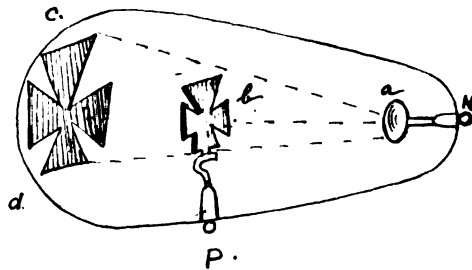


Fig. 2.

these rays would make a number of chemical compounds to phosphoresce very brilliantly. This cathodic discharge could be deflected by a magnet or otherwise by an electro-

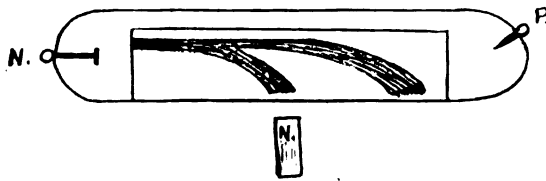


Fig. 3.

statically charged body. See Fig. 3. Two cathode streams parallel to each other in the same tube would repel. A light windmill suspended in the tube would be set into rapid rotation, or if the discharge were deflected so as to strike the opposite arms the deflection would be in the opposite direction. The cathode stream cannot turn a corner. In a V-shaped tube (see Fig. 4), if the upper electrode in the right arm is made negative and the electrode in the left arm positive, the cathode stream illuminates the right arm. If the connections are reversed, the left arm glows.

With the cathode concave and a piece of platinum placed at its focus, the platinum would soon be heated red hot.

From these facts Crookes came to the conclusion that all the phenomena of the cathode discharge would be duplicated by streams of particles proceeding from the cathode, and he therefore concluded that the cathode ray consisted of particles of air which became charged negatively while near the cathode and were therefore repelled.

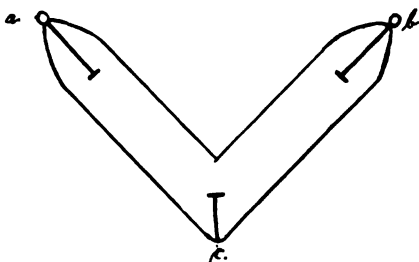


Fig. 4.

Another interesting experiment by Crookes was the placing of both terminals in one part of the tube and shutting this off from the other half by a diaphragm in which were two slits with small wheels provided with veins placed near them. Excitation of the tube showed that not only did the wheel rotate that was directly in front of the cathode, but that there was a return current of particles through the other slit in the diaphragm. This return current was shown by the fact that the other wheel rotated in the opposite direction. (Fig. 5.)

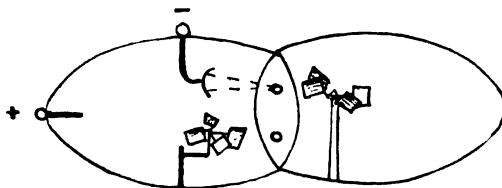


Fig. 5.

Swinton devised a tube to test whether there was any return from the anode back to the cathode. He had both anode and cathode facing each other in the walls of a cylindrical tube. At one end of the tube was mounted a small radiometer

on a sliding rod so that it could be placed immediately between the anode and the cathode, thus being in the cathodic stream (Fig. 6), or it could be withdrawn far to one side and

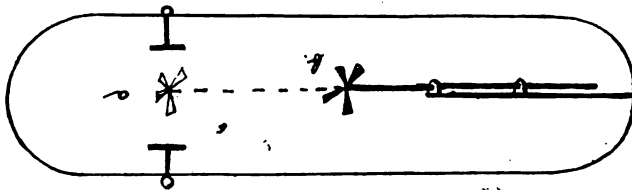


Fig. 6.

therefore out of the influence of the cathodic stream. (Fig. 3.) When in the first position it was set in rotation by the cathodic stream. When out of its path, it rotated in the opposite direction, proving that there was a distinct return of the particles from the anode.

Swinton also found out that the cathodic stream from a concave cathode is hollow and after it converges to its proper focus the stream then diverges, being hollow as before. These phenomena depend upon the vacuum in the tube and must be lower than that suitable for the production of X-rays.

Lenard obtained these rays outside of the tube and proved that they possessed all their well known properties when traveling in the air. To do this he constructed a cylindrical tube with the cathode at one end, and at the other end of the tube he had a very small aperture, over which was cemented a strip of very thin aluminum foil. The Cathode Rays, which would not penetrate the glass wall of an ordinary tube, will penetrate this thin aluminum window. He investigated the effect of different pressures and different kinds of gases on

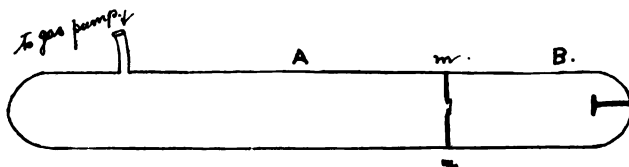


Fig. 7.

the cathode ray. He accomplished this by cementing a second tube to a tube provided with an aluminum window. (See Fig. 7.) The vacuum in this second tube could be changed from an ordinary atmospheric pressure to a vacuum higher

than was suitable for the passage of any kind of an electric discharge through it. It was found that for any gas at atmospheric pressure the cathode ray was very quickly absorbed, not being detected at a distance of more than three-quarters of an inch, but as the air pressure was reduced the rays passed at a greater distance and were not so easily defused. At the very highest vacuum the rays passed entirely through the second tube and no defusion was apparent.

Lenard argued that the cathode rays must be a kind of radiation in the ether; that they were not generated at the aluminum window was shown by the fact that they passed straight from it, whereas, if they were generated at this point, they would have radiated outwards in all directions.

Goldstein agreed with Lenard that the cathode rays must be a kind of radiation in the ether, and rejected the theory of Crookes. He conceived it must be impossible for particles of gas to be projected through a solid, as was the case when the cathode rays passed through aluminum foil.

A number of investigators proved that the cathode rays are heterogeneous. Those emitted by relatively low vacuum are more easily deflected by a magnet than those of higher vacuum. At the same time this theory was being upheld in Germany, the theory of Crookes was gaining adherence in England. No one has done more for it experimentally than J. J. Thomson. He proved that the negative charge always accompanies the cathode stream, no matter how it may be deflected by a magnet, and argued that the particles themselves carry the negative charge. In one of his tubes he had two concentric cylinders—one connected with the earth and the inner one to an electrometer. The cathode was so placed that the rays would not strike either of these cylinders, which were in a side tube. When the tube was first excited no charge was given to the inner cylinder, but when the rays were deflected so as to fall upon it the cylinder was charged. The amount of this charge could be measured, the strength of the magnetic field could be determined, and the amount of heat generated by the cathode ray could be determined. By a course of mathematical reasoning, which we will omit, the ratio of the mass of the particles carrying the charge to the charge itself could be determined from these

measured quantities. A similar determination had been made for the same ratio when a galvanic current is conducted through a solution of salt. It was found that this ratio for the cathode ray was only about one-thousandth that for the galvanic current. Thomson therefore concluded that the mass of these particles was one one-thousandth of the ordinary atoms. This ratio was the same for all rarefied gases which he successively tried. He therefore conceived that the particles in the cathode stream were not molecules nor atoms, but were bodies very much smaller. The atom must then be split into corpuscles.

J. J. Stokes has elaborated the mathematical theory, proving that a stream of such corpuscles would be capable of producing an irregular pulse in the ether by being stopped at the anti-cathode, and such an irregular wave could present phenomena similar to those of the X-ray. This corpuscular theory of the cathode ray is gaining ground, but it will require much more experimental proof to bring physicists to positively state that the atom can be divided into smaller corpuscles.

#### DISCUSSION.

Dr. Marsh said that the subject was one of importance to physicians only because of its general scientific interest. The physician is interested in what goes on outside of the tube. Much of the material was entirely new to him.

Dr. Coleman asked the reader of the paper whether these cathode rays, even when allowed outside of the tube, were ever used for therapeutic purposes. The reply was that they had never been obtained outside of the tube in great enough abundance to test their efficiency. It was only the X-ray that was now in use.

Dr. Decker asked whether, in the experiments of Lenard and Wiedemann with a double tube, the cathode rays, on passing to the walls of the second tube, had produced the X-rays from the point where they strike the tube. The reply was that the tube fluoresced at the point of bombardment, but the paper did not explicitly state that X-rays were obtained. The amount of cathode rays in the second tube was necessarily very small, because the aluminum window cov-



ered a very small aperture, and the rays through this must necessarily be of small intensity. Dr. Decker wondered, in view of the fact that aluminum is permeable to the cathode ray, why such tubes are not constructed of aluminum. Dr. Grubbe explained that a tube of the required thinness could not withstand the atmospheric pressure on the outside walls of about fifteen pounds per square inch.

Mr. Friedlander asked for special information concerning the para cathodic rays, and said that it would be interesting to try the experiment mentioned in the paper.

Dr. Grubbe said that the paper saved him a good deal of work in looking up the general subject. That while the physician does not use the cathode ray, he does need to know something of its nature, because from it the X-rays seem to originate. The radiation used by the physician is now called the X-ray—that is, the unknown ray—because so little is known of its properties. Unfortunately, the experimental investigation of these radiations must necessarily be delegated to a few individuals who have the advantage of the special equipment and apparatus. If more could investigate these radiations from the practical standpoint we might much sooner learn more definitely their true nature. Crookes in England has done very much in the cathode ray investigation, but he has his hobby—that is, his theory—which he wishes to prove. The German physicists also desire to prove their theory. It sometimes happens that an investigator clings too strenuously to a single fact or a group of facts that aid his theory, and neglects the phenomena of equal importance which are at variance with his theory. The corpuscular theory of Crookes seems to explain the origination of the X-rays in a satisfactory manner from the practical standpoint. For instance, the X-rays are generated more abundantly from an anti-cathode made of an element of great atomic weight. Thus, platinum is much better than aluminum, but it is also true that uranium gives forth rays of even greater intensity than the platinum. The atomic weight of uranium is greater than that of platinum. The uranium anode is not, however, practical, because it is very easily volatilized and thus reduces the vacuum. A very practical point in the paper is the experimental evidence

that the cathode rays from a concave cathode are in a hollow cone. This proves the point which the makers of the tubes have denied—that the anode must be placed at the exact focus of the cathode rays. When this point of the cone falls upon the anode, X-rays from a very small point originate—namely, from the point of bombardment. When, however, the area of bombardment is larger than a point, the X-rays will not give sharply defined shadows, and the tube is inferior for skiagraphic work.

Mr. Treadwell closed the discussion by alluding to attempts made by Silvanus P. Thompson to concentrate the cathode ray coming from a plane cathode by passing the ray through a funnel-shaped piece of glass in the tube. See Fig. 8. It was

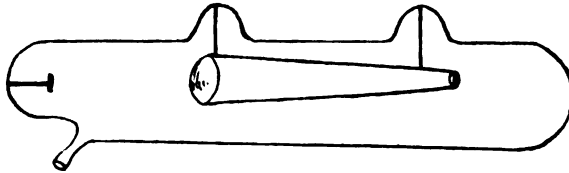


Fig. 8

found that the cathode ray could not be thus concentrated. He also spoke of the so-called splash phenomena mentioned by Thomson. These phenomena are seen frequently in ordinary X-ray tubes. They are indicated by irregular streaks of fluorescence on the walls of the tube when it is either very high and does not light up properly or when the terminals are reversed. Thomson considers that these phenomena are due to the splashes of the cathode stream upon the walls of the tube.

Wherever they strike, new X-rays are generated, and a tube exhibiting such phenomena will not give a good skiagraph.



## THE ACTION OF THE X-RAY AND ITS USES IN THERAPEUTICS.

A paper with the above title was read by William Benham Snow, M. D., before the American Electro-Therapeutic Association September 2nd, 1902, and published in the *Journal of Advanced Therapeutics*. The paper was of such great interest that we shall make liberal extracts from it and from the discussion which followed.

Dr. Snow holds that it is of very little importance whether the coil or the static machine is used to excite the X-ray tubes. He prefers, however, to use a powerful static machine for the excitation of high tubes when treating deep-seated malignant growths. He believes that a coil is apt to puncture a high tube more easily than would a static machine. While recognizing the fact that many workers are using the low vacuum tube for therapeutic work, he claims that tubes of high vacuum are as efficient even in superficial cases and are absolutely essential for deep growths.

### EFFECTS ON LIVING TISSUE.

"The characteristic effects upon living tissue following a prolonged exposure or series of short exposures are: (1) induction of impaired nutrition marked by alopecia and atrophy of the cuticle; (2) irritation evidenced by an itching sensation; (3) inflammatory action; marked by tanning dermatitis or deep necrosis, the latter followed by sluggish reaction and retarded restoration. The extent of the inflammatory process depends somewhat upon the character of the ray, but particularly upon the length and frequency of exposures and the idiosyncrasy of the patient; (4) the rays destroy some forms of germ life, either by a specific action (which is doubtful); possibly by stimulation and attenuation from overgrowth; or, most probably, by rendering the pabulum unsuitable for their existence. As recently stated by me in a discussion before the Clinical Society of the New York School of Physical Therapeutics, and published in the July number of the *Journal of Advanced Therapeutics*, I believe; (5) that the effect upon normal tis-

sues is first to stimulate normal action, due to the vibratory effects of the rays, or of the ether in the presence of the rays; (6) that short exposures induce activity of normal tissue cells, which, in some cases, supplant abnormal tissue elements, without showing evidence of disintegration; (7) that longer exposures destroy the abnormal tissue elements of low vitality, but do not seriously affect normal tissues unless the exposures are too prolonged; (8) that abnormal tissue elements thus exposed break down and disappear through the natural channels of absorption, or by sloughing; (9) when tumors of considerable extent are rayed, rarely, if ever, over small tumors, a marked reaction occurs, with fever and varying degrees of prostration, and in a recent case of cancer of the uterus treated by me there was severe diarrhea following the sixth exposure. The reaction, in my experience, has occurred on the day following two days following even the sixth exposure. It is likely referred to days following even the sixth exposure. It is likely that the reaction arises from breaking down of devitalized tissue, and auto-infection, which is often marked during the sloughing process.

"The results of the tissue changes, as studied microscopically, after a course of X-ray treatment, to the present time are not conclusive. It is hoped, however, that careful investigation in this particular will be made in the future. There are doubtless many effects derived from X-ray exposures upon pathological conditions, which require other explanations than the above actions will include.

"While at the present time the X-rays are employed specifically in the treatment of the most intractable types of disease, favorable results have also been obtained in many conditions not associated with malignant disease. In this particular the reports are most encouraging. Basing our therapeutic applications upon the indications shown from the action of the rays, we are led to apply them to all conditions where it is sought to replace unhealthy tissue growth by that which will be normal. Tissue of low vitality, characterized, as it may be, by the presence of some specific process, we repeat, is broken down and destroyed by the X-rays; at the same time, the vitality of the normal tissues is not lowered to a dangerous degree, which makes it possible that normal tissue will supplant

the disintegrated neoplasm. In order to facilitate the restorative action to the greatest degree by the reconstruction and replacement of broken-down cells by a healthy new growth, some means which will contribute to the induction of an active and healthy metabolism is indicated. For this purpose, we believe, for its effects upon superficial structures, there is no other measure equal to the brush discharge, as administered with the wooden electrodes connected with a metallic grounded circuit, the patient being insulated and connected with the negative side of a static machine, the positive side being grounded. The results, uniformly obtained from the employment of the brush discharge, we believe, justify its general adoption in the treatment of all open and ulcerating surfaces, malignant or otherwise.

"(10) Another action is suggested by results obtained from its control of pain and hemorrhage, viz., that it causes in the deeper structures, as well as the skin, contraction of the muscular coats of the arterioles, relieving congestion and the consequent pain, as well as diminishing hemorrhage in some diseased conditions, as cancer and fibroid of the uterus."

Regarding the treatments of deep-seated tumors, he gives the following paragraph and illustrated case:

"High tubes, the removal of intervening materials, raying through open cavities, and the employment of tubes, which may be placed within such cavities, and regulations of frequency and length of exposures, may all contribute to the successful termination of malignant growths, not superficially located.

"When tumors beneath the integument or in the closed cavities of the body break down, as they often do, auto-infection, as a rule, occurs, associated with rise of temperature and marked depression. These cases will prove fatal in many debilitated patients. The writer is familiar in his own practice and that of others with cases which have given unquestionable evidence of such infection following or associated with sloughing. It is therefore a matter of great importance when undertaking the treatment of a case of internal cancer to consider the advisability of having the bulk, if not the whole, of the malignant growth removed after a short period of raying and thus prevent the danger possible to arise

from auto-infection and at the same time increase the patient's chances of recovery.

"The advisability of operation in cases which, without the employment of the X-ray, would be considered inoperable, will offer encouragement for a successful termination in many cases. I have in charge a case in which there was cancer of the uterus and appendages, which was referred by me to Dr. Frank Hartley, and operated upon by him in the New York Hospital, in which an operation would have been useless but for the fact that the X-ray was to be employed after the operation. Unfortunately, in this case, it was impossible to have the X-ray employed at the hospital, and for some time after the patient's dismissal she was unable to make the necessary trips to and from my office. After six weeks, on account of severe hemorrhage, without consulting me she returned to the hospital, but was not admitted, but referred to my office. When the patient came, the vault of the vagina was open and ulcerating, the recto-vaginal septum was indurated, there was a vaginal discharge, which was extremely offensive, and the ulcerated surface bled freely. In this case it was deemed best to ray the parts through a speculum. After each treatment the patient was tamponed with iodoform gauze which was left in position for forty-eight hours. She has continued to come to my office every second day. After the third raying the discharge ceased to be offensive and the hemorrhage had practically ceased. Since the third time she has also been rayed above the pubes, and at present the ulcerated surface appears to be healing, hemorrhage has ceased, the tampons have been abolished, and the patient bids fair to make a recovery.

"It seems that this is the rational procedure, which should be followed in all similar cases, operable and inoperable. In the light of present experience we feel justified in saying, no malignant tumor should be operated upon unless it is to be subsequently rayed, and we believe, as well, that raying should precede the operation, at least for a short time in most cases. At the present time, in the face of surgical history and the scars produced, it is absurd to contemplate any operative procedure whatever upon a superficial epithelioma. In the treatment of both forms of lupus, the X-ray should, we believe, be

used, in conjunction with the static-brush discharge. Our plan is to ray the patch upon alternate days, employing from the first the brush discharge daily."

#### THE BRUSH DISCHARGE AS AN ADJUNCT TO THE X-RAY.

"We have demonstrated that lupus vulgaris may be cured by the use of the brush discharge alone, but undoubtedly the results are greatly hastened when employed in conjunction with the X-ray. On the other hand, in our experience, lupus erythematosus yields so slowly to the brush discharge that it is questionable if it can be cured in many cases without the additional use of the X-ray. After faithful employment of the former, for more than six weeks daily, in one case the improvement was but slight; the case was then exposed to the X-ray on alternate days for ten minutes; six exposures were made, when the surface began to slough, and continued to do so. The brush discharge was actively employed as previously, and the whole surface was rapidly healed within one month.

"Another case is of lupus erythematosus, of seventeen years' standing, which has been known during that time to the leading dermatological clinics in the city of New York. The patient was rayed on alternate days eight times, beginning on June 16, 1902. The brush discharge was employed daily. The case made a most rapid and uninterrupted improvement. On August 25 it was thought best that another series of raying be instituted. The case is now so greatly improved that but a short period remains to complete the cure."

#### THE RAYS TREATMENT OF NEUROSIS.

"The effects upon painful conditions of neurotic character are truly wonderful. A case of tic douloureux of eight years' standing, during which time paroxysmal attacks have been constant, was relieved after each exposure and has remained cured for five months after four X-ray exposures at which a tube of high vacuum was employed. Another case of brachial neuritis, involving the plexus within the chest, was greatly relieved, and the cure hastened by exposure to the rays from a high-vacuum tube."

A POST-OPERATIVE CASE.—TUBERCULAR GLANDS.

"A case of more than usual interest was one in which tubercular glands had been removed, along the course of Poupart's ligament on the left side. Two weeks after the operation the surrounding tissues were deeply indurated over an area three inches in diameter, and showed no signs of healing. The wound had a cadaverous appearance. The case was referred to me by my assistant, Dr. Grad, in the clinic of the New York School of Physical Therapeutics. The improvement after the third exposure to the X-rays was most remarkable. In this case also, as in all ulcerations and open surfaces, we employed the brush discharge on each day that it was exposed to the X-rays. The rays were employed in this case five times, and the unhealthy wound granulated and healed rapidly.

LESSONS LEARNED FROM A TUMOR OF THE ORBIT.

"A tumor upon the orbit rapidly vanished, and it was demonstrated in this case that the eye is no more susceptible to X-radiance than the skin; (2) that large tumors disappear by sloughing within mucous cavities; (3) that the process of sloughing is associated with rise of temperature and depression; (4) that the greatest progress towards improvement takes place during periods marked by lost appetite and depression, possibly a coincidence; (5) that high-vacuum tubes are indispensable to the treatment of such cases; (6) that with great caution and raying every second day, for ten minutes, may be followed by second degree dermatitis; (7) that patients do not become more tolerant from prolonged treatment; (8) that when the tumor is removed by the rays from one part, it may assert itself with vigor in another location; (9) that malignant tumors beneath the integument will disappear when exposed for a period of time to the X-ray; (10) that long periods of time are essential in some cases to effect a cure or determine a failure."

He states that these cases are not selected and were not subjected to any other kind of treatment either internal or external. Case 14 shows the cumulative effects of the X-ray



and emphasizes the necessity of carefully watching all patients for severe dermatitis. A medium tube was used with a weak light; the length of exposure and the distance of the tube were changed at different times.

In the discussion which followed Dr. G. Betton Massey alluded to the treatment of cancer by mercurial cataphoresis, saying that but few had adopted this valuable treatment because of the difficulty in its technique and because of a necessity of employing an anaesthetic. He agreed that the X-ray treatment was especially valuable in connection with operative cases. Dr. C. R. Dixon spoke of the systemic effects of the X-ray. He had known severe diarrhea to occur soon after the use of the X-rays at the time when the tissue was breaking down. The brush discharge should be used in all open cases. He had found that the patient became more tolerant of the X-ray after being "tanned."

Dr. J. D. Gibson was of the opinion that all chronic inflammations, even where there might be small collections of pus, could be favorably influenced by the X-ray. He had treated several cases of antral abscess occurring in persons suffering from neuralgia and in whom the antrum had already been washed out. The X-ray afforded relief. He believed good results would follow the use of the X-ray in Fibroid Tumors, particularly in those cases showing tendency to hemorrhage. In one such case the galvanic current had proved inefficient, but the X-ray controlled the hemorrhage with fifteen minutes application. The tumor was uterine and was of large size. As a result of a course of X-ray treatments the circumference at the waist had been reduced about six inches.

Dr. M. F. Wheatland was treating a case of chronic appendicitis with the X-ray and had noted that his chronic constipation was relieved. The patient had been relieved of pain as well. Another case of cancer of the breast became rapidly worse after the X-ray treatments—pulse intermittent—the result probably of auto-infection.

Dr. Francis B. Bishop said he had had remarkable results in tubercular glands of the neck and enlargement from myxedema. The patient was a young woman with glands about the size of a large orange; after a few weeks of treatment swelling reduced to the size of a hickory nut.

GOITER TREATED WITH BRUSH DISCHARGE.

Patient placed upon positively insulated platform; operator held a stick two and a half feet long to the end of which was attached a very fine wire. With this, without any discomfort to the patient, the entire surface could be reddened in a very short time. After twenty days of treatment, the circumference of the neck was reduced about three-quarters of an inch. Dr. J. R. Nunn said that the powers of the patient should be tested and the treatment stopped short of producing so much poisoning that the patient could not tolerate it without severe reaction. He held that both the diarrhea and the constipation noted in different cases were evidence of constitutional effect. He stated that either the static machine or the coil could produce burn. The selection of the tube was all important.

Dr. Wm. James Morton stated that the X-ray should be preferred to either the knife, caustic pastes or mercurial cathaphoresis in superficial cancers, especially those of the face. These other agents removed tissue in bulk both healthy and the diseased, while the X-ray when properly applied will influence the diseased tissue alone. In his own practice he had discarded the use of the screen—in the treatment of carcinoma because he wished to treat all the surrounding lymphatics which might possibly be involved. He uses the screen only to protect the hair and eyes—with the proper precautions he believes that the X-ray might make the hair grow better. He moves the tube frequently so that the concentrated area of the radiation might fall on different parts. The X-ray requires a generous amount of time, however, to cure cases of cancer.

A CASE OF ACNE OF THE FACE WITH EXTENSIVE SCARRING.

The method adopted was to burn as much as was safe; treatments kept up for six weeks; burning extended to the true skin, which peeled off five times; eyebrows did not fall out. After four weeks of desquamation the face began to resume its normal color and skin became smooth. He would not recommend this method in all such cases although satisfactory in this one. He was disappointed in seeing the brush discharge used in conjunction with the X-ray because there would be doubt as to which was the efficient agent. One practitioner

in London claimed that the results from the X-ray tube were due to ordinary electricity, not to the ray. Regarding the static machine and coil, he used both indifferently and did not consider the coil harder on a tube than a static machine. The X-ray was the same whatever generator was used to excite the tube. His experience in the treatment of Carcinoma situated deeply in the abdomen was chiefly with cases upon which operations had been attempted and the X-ray used as the last resource. In such post-operative cases metastases have usually progressed into other neighboring tissues, for instance, throughout the omentum and perhaps the liver. The X-ray could hardly be expected to eradicate such widely spread infection.

In some of the more limited cases of cancer he would favor treatment until only a small nucleus was left, which could then be removed by minor operation.

Dr. Snow in closing the discussion said he had used up six tubes with the coil to one with the static machine. He advocated the brush discharge because he had failed in some cases with the X-ray until the brush discharge had been used as an adjunct. He favored the discharge in all superficial cases.

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#### A GALLSTONE SIMULATING CANCER.

In the British Medical Journal of June 21, 1902, Bernhard Morris describes the case. A man of 67 years had occasional attacks of hæmoptysis and hæmatemesis simulating intestinal obstruction. Though no tumor could be detected, the symptom of coffee-ground vomiting led to a suspicion of cancer. In one of the attacks he became unconscious, and, on being revived by artificial respiration, he complained of severe pain in the annal region. Examination disclosed a gall stone about the size of a walnut, with corrugated surface. Its weight was 259 grains. Subsequently the patient improved and had no more attacks of pain.

Comments: The radiographer cannot but think that a correct diagnosis could have been made very early with the aid of the X-ray. A gall stone of such size would have been revealed. The patient would have been saved much suffering.

## BOOK REVIEW.

The Use of the Roentgen Ray by the Medical Department of the United States Army in the War with Spain. *Prepared under the direction of Geo. M. Sternberg, Surgeon General, U. S. Army, by W. C. Borden, Capt. and Ass't Surgeon, U. S. Army.*

The report is a quarter vo. volume of 98 pages, giving besides the clinical history of a number of cases of gunshot injuries, the radiographs of the parts. The technique of the work is described very fully. The injuries were inflicted on both the shafts and extremities of the long bones. The missiles in some cases passed out of the body, in other cases were lodged in the tissues. Several radiographs are given, showing the bullets located in the skull and in the chest. A very interesting clinical history was the following: A private was wounded at five hundred yards range by Mauser bullet, which passed obliquely through the hand, fracturing the third metacarpal bone by contact and completely destroyed the distal end of the fourth metacarpal bone, and carried out all the fragments through the exit wound. This wound was hardly larger than the wound of entrance and only the radiograph would have revealed the true condition. The wound healed readily because aseptic. Some impairment of function resulted, as motion of middle, ring and little fingers were restricted, especially in flexion.

The operation of both static machine and coil for radiographic purposes was described. A very interesting recommendation is the following: "The condenser of the coil is made in sections and is connected to a series of four plugs on the top of the base, by which it is possible to use any portion or the whole of the condenser at will. It will be found that some focus tubes will work best when only using a few sheets of the condenser or as other focus tubes require considerably more condensers and in some cases it is necessary to plug it all in."

All the coils with which we are familiar have condensers of fixed capacities. We should like to see whether this might not be a valuable adjustment in all coils.

A very interesting observation is, that the upper end of the tibia may be pierced without comminution or complete fracture. Two X-ray burns were reported; one upon the shoulder and breast, due to three attempts at a radiograph on successive days. The exposure was twenty minutes with the low tube at a distance of ten inches; coil was used. The burn was not healed entirely for eleven months. The other burn was made by a static machine. The exposure was twenty-five minutes on successive days, three times. The part radiographed was the kidney. There was no ulceration and the irritation disappeared within ten days.

The character of the work was indeed of a high order, especially so in reference to the unfavorable conditions under which it was done, namely, a tropical climate.



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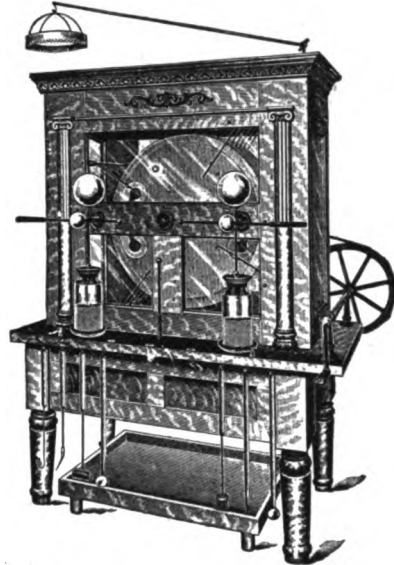
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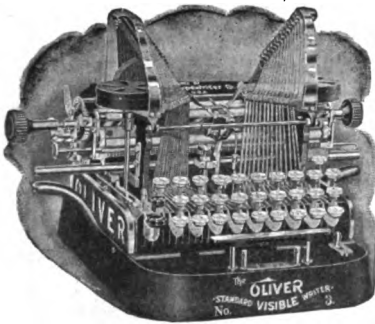
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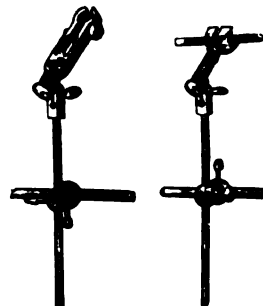
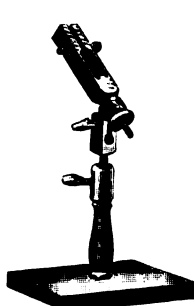
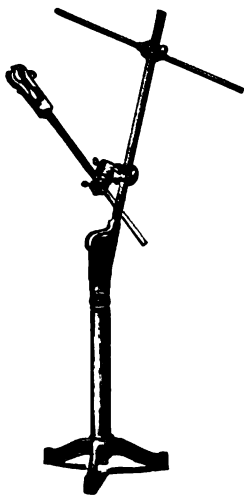
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# American Electro-Therapeutic and X-Ray Era

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No. 2

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## Original Contributions

### THE X-RAY IN GLEET.\*

Having made use of the X-ray in treating a number of cases of gleet, I have been asked to give my experience with it.

How long the X-ray has been used for this purpose, or by whom first employed, are questions which I cannot answer, and I have found no literature upon the subject.

It was first suggested to me by Dr. Frankenstein of this city, who asked me if I had ever tried the use of the X-ray in any cases of gleet.

I replied that I had not, but did not see why it was not a reasonable treatment, based upon the general inhibiting action which the ray has on the formation of pus.

Thereupon Dr. Frankenstein turned over to me for treatment Case No. 1, and I will relate my experience with this and a number of other cases, in which the results certainly seem to show conclusively the therapeutic value of the X-ray in this common but stubborn class of cases.

CASE NO. I.—This case, in a young man of 25, had been carefully and thoroughly treated by Dr. F. with urotropin, irrigations, deep injections, sounds and in short the usual routine treatment. The stricture, which had at first existed, had been entirely broken down and a large sound passed easily, but still the "morning drop" persisted.

October 4, 1902, I gave the first X-ray treatment, exposing the perineum and ventral surface of the penis to the rays for a period of seven minutes, using about a  $1\frac{1}{2}$  ampere current.

\*Paper read before the Chicago Electro-Medical Society, January 27th, 1903.



Patient was requested to return on the second day, but failed to do so and did not show up again until October 14, ten days later. He then informed me that the discharge stopped forty-eight hours after the single treatment and had not reappeared until that morning. I then gave the second treatment, same as the first, and again the patient failed to materialize on the second day. He was next heard of by Dr. F. on October 23, when he reported himself cured. On October 29 he came back, saying there was a slight return of the trouble and I gave him a third treatment; a fourth on November 1, and a fifth on November 3. Since then Dr. F. has passed sounds once or twice, but told me a day or two ago that he had seen the young man that morning and that there has been no return of the gleet.

CASE II.—Case of gleet in a man of 40. He had had it fifteen years. Operated on a year ago for stricture. I gave treatments of five minutes' duration every day at first. On reporting for the fourth treatment he informed me that the discharge had stopped and that the preceding night was the first in fifteen years that he had passed without having to get up once or twice to urinate. I gave daily treatments up to ten, then every other day for five treatments, and finally every third day for five more. I heard from this patient a few days ago and there has been no return of the trouble.

CASE III.—This case came to me early in the summer with stricture and gleet. Under usual methods the purulent discharge disappeared and the urethra admitted a large sound without difficulty. Still there was a slight discharge in the morning, which patient described as "clear and watery." I gave five-minute X-ray exposures October 8, 9, 10, 11, 14, 15 and 16, seven in all, without apparently affecting the case in the least, and after this the X-ray treatments were abandoned.

CASE IV.—This patient was a young man of 25 who has always been very susceptible to venereal diseases. I first treated him six years ago for gleet, existing at that time seven months after his first case of gonorrhea. I exhausted my resources at that time, but finally cured him with deep injections of 5 per cent argonin solution. Since that time I had twice treated him for gonorrhea; once for chancroid, and had operated on him twice for stricture. About the middle of October he applied to me for treatment again, having contracted

his fourth case of gonorrhea nearly four weeks previous. He had been ashamed to come to me again and was in bad shape. I gave him an injection of 1 per cent protargol solution for a week with slight but not marked improvement. I then induced him to let me use the X-ray. Daily treatments for five times, then every second day for five more. Discharge stopped after the fourth treatment, but reappeared in four days. It then stopped in forty-eight hours and did not return.

CASE V.—This case of gleet was of several years' standing. Patient a married man, aged 35. I passed sounds and found no evidence of stricture. Daily exposures of ten minutes each were given for five times. Discharge then stopped. I undertook to continue treatments every other day, but patient was irregular and they averaged about two a week for three weeks when treatment was discontinued as there was no trace of the gleet remaining.

CASE VI.—This case had existed about four months at time patient came under my treatment. He had undergone usual routine without being entirely cured; in fact, just previous to taking X-ray treatment gonococci were still present on microscopical examination of the discharge. This patient came from a distance and was a busy man who had little time to spare, so I attempted to crowd the treatment. November 22 I gave a ten-minute treatment at 9:30 a. m. and again at 4 p. m. Each treatment was followed by the use of the violet ray and spark along the course of the urethra. Third treatment at 10 the next morning, when patient told me there had been no discharge that morning, for the first time since the trouble began, and also that the itching along the canal had ceased. Incidentally I noted in this case that herpetic eruptions back of the glans healed in a wonderfully short time. Fourth treatment at 4 p. m. same day. Patient then left for home, returning for two treatments on November 26 and again on November 29; making eight in all. Eight days after this patient wrote me of the return of the discharge. I mailed a prescription for an injection of resorcin, gr. x, and zinc sulphocarbolate, gr. ij to the ounce of water, and requested him to come up for treatment as soon as possible. On December 9 I gave one treatment and two on the following day, when discharge had stopped, and as I have not heard to the contrary I presume there has been no return of it.

CASE VII.—Gleet in boy of 17, following home treatment for his first case of gonorrhea. Ten-minute treatments with ray and spark daily for three times, then irregularly for six treatments. Discharge stopped after five treatments and has not returned.

CASE VIII.—Man of 32 with gleet following his third attack of gonorrhea. This case was treated in a similar manner to the preceding ones, the discharge stopping after the seventh treatment. Fifteen treatments in all were given.

CASE IX.—A case of gleet of many years' standing. Discharge did not stop until after twelve treatments; returned in a week and then stopped after three daily treatments. No treatments now for nearly four weeks and no indications of gleet.

I have cited here only those cases in which the X-ray was the only treatment used. A number of other cases, including several of acute gonorrhea, have been treated with the X-ray, but for various considerations the usual medicinal treatment has been followed at the same time, and therefore the credit of curing them cannot be given to the X-ray, although its influence in these cases has usually been apparent.

I think that in the start I did not give long enough treatments, as I was afraid of exciting too much reaction, but I have not yet seen a single case in which any unpleasant symptoms could be attributed to the use of the ray.

In giving the treatments I place the patient on his back with the legs flexed and spread apart. The penis and scrotum are drawn up on the abdomen, the patient grasping one testicle in each hand and drawing them apart. Strips of sheet lead are then adjusted so that only the ventral surface of the penis and the perineum are exposed to the rays.

The treatments are given for ten minutes with a low tube on a 110 volt direct circuit and about a  $1\frac{1}{2}$  ampere current. I now follow each with a short treatment with a high-frequency tube giving a blue or violet light and spark. I start out to give five daily treatments, then five treatments every other day, and then gradually drop off. Irregularity on the part of patients usually prevents this from being carried out exactly as the physician would desire.

NOBLE M. EBERHART, M. S., M. D., F. S. Sc. (London).

100 State St., Chicago, Jan. 27, 1903.

DISCUSSIONS.

Dr. Neiswanger said that the paper was not only interesting, but as far as he knew, the work was absolutely new. Certainly the results obtained were nothing short of marvelous. To be sure, the doctor has used the high tension current in connection with the X-ray, and this alone might have done good, but the difficulty of getting patients to submit to X-ray treatment alone justified the procedure.

The importance of this work cannot be overrated, because a gonococcus infection is the cause of most of the lesions treated by the gynecologist. Many patients are unaware of the infection. Hardly any disease is more insidious, not even excepting tuberculosis; the sequelæ are most serious. Nine-tenths of gynecological troubles are due to the gonococci. The success in this work surely warrants the suggestion that the X-ray be used in the treatment of these diseases in women. He would give it a thorough trial.

Dr. Street said that in the early part of the paper he had wanted to ask questions on the technique of the treatment, but these had nearly all been answered. He, however, asked for more details concerning the technique and received the following answer: A low tube was used, a regulating vacuum tube; no dermatitis had been provoked, not even a discoloration. Dr. Street suggested that lead foil should be used and that a slit should be cut in this. The borders of the cut to be turned back so as to expose as much of the surface as was needed of the perineum and the lower surface of the penis.

Dr. Burdick commended the paper very highly. He stated that he had treated a few cases of chronic gonorrhea and while he was able to stop the discharge, it would return every now and then even when the treatment has been pushed. He believed that most of these cases of gleet were due to a primary tubercular infection. That in fact the majority of the deep-seated urethral discharges were due to tubercular infection. He recommended that the doctor double-stain his slides in order to exclude the tubercular bacilli.

In his work on cultures of bacilli he had not been able to kill any cultures of gonococci, even after exposing for three or four hours. To be sure the exciting apparatus and par-

ticularly the X-ray tubes have been remarkably improved and it is possible that those experiments should be repeated, but of one thing we are certain, that the X-ray will cure any superficial lesions of a tubercular nature. It produces trophic effects. A tubercular ulcer will dry up and granulations promptly appear.

The paper opens up a great field and points to the value of the treatment in all gynecological cases which result from infection by the gonococci.

## THE TREATMENT OF CONSTIPATION BY ELECTRICITY.\*

By May Cushman Rice, M. D., Professor of Electrolysis and Clinical Electro-Therapeutics, Illinois School of Electro-Therapeutics.

There is no functional disturbance that the physician is more often called upon to treat than Constipation, and could we name all the diseases that result from this cause we should cover a large percentage of the ills to which flesh is heir.

Constipation consists in a retention of the feces from functional inactivity of the intestinal canal or from abnormalism of the biliary or other secretion. It may also be due to mechanical obstruction of the intestinal canal, paresis of the intestinal walls or to general depression of vital energy.

Proper elimination is the chief factor in maintaining good health and the principal eliminating organs are the intestines, kidneys and skin, named in the order of their importance.

Nature seeks to establish an equilibrium. Consequently, with insufficient elimination from the intestines the kidneys and skin are overtaxed. The former, attempting to do the work that they were never intended to perform, are irritated in consequence and inflammation results. The skin, not unwilling to share its part of the burden, attempts to eliminate

\*Paper read at the meeting of the Chicago Electro-Medical Society, January 27.

toxic substances intended for other channels, which are frequently the cause of acne, urticaria and like lesions. Therefore, in spite of all efforts of kidney and skin, a great mass of toxic substances generated in the alimentary canal are absorbed by the general system. The circulatory system is impaired, the blood, loaded with toxic material, deteriorates as evinced by a decrease in the number of red corpuscles. The nervous system is affected and headaches and neurasthenia result. As direct results of improper evacuation of the intestines, a catarrh of the mucous lining of both stomach and bowels is induced, the tongue is coated, the appetite lost and either through the taking of an insufficient quantity of food or failure of assimilation, nutrition is impaired.

To prescribe laxatives is only to relieve temporarily and in the majority of cases the patient has exhausted the more common remedies before applying for treatment. In electricity, however, we have a therapeutic agent for permanent relief that cannot be overestimated.

Constipation is a symptom. It is due to a morbid condition. Therefore we should treat the condition rather than the symptom.

There are four classes of conditions, which cover the main causes of constipation, viz., relaxation of abdominal muscles, lessened secretion of the glands, loss of sensation of the nerves and an irritated state of the rectum. In cases caused by relaxation of the abdominal muscles, all that is necessary for relief is to impart a better tone to these muscles. The Electro-Static Wave Current or Surging is the most beneficial and should be given in the following manner: The patient, sitting upon the side of the chair on the insulated platform, inserts a rectal electrode with a metallic surface so that the metal is grasped by the sphincter and is not allowed to pass higher up. The leyden jars are on, switch pointing to spark, negative pole grounded. The prime conductors, together at first, are gradually separated until there is a spark gap of at least six or eight inches, with a discharge of not more than four per second. Of late, I have been leaving the jars off and find it yet more effective.

This treatment is painless. It produces a powerful massage, which affects the entire alimentary canal. This is given for

twenty minutes daily until there is an improvement, then every other day. In some cases, evacuation occurs the day following the first treatment. In others, three or more treatments are necessary before obtaining a result.

The treatment by the use of the galvanic current is also very beneficial. Two small hand sponges, thoroughly wet and soaped, are held about three inches apart and passed over the abdominal wall in the direction of the colon. A current strength of from fifteen to twenty milliamperes, giving about one hundred interruptions per minute, is sufficient to produce strong muscular contractions over motor points and is maintained for five minutes.

The positive sponge is now placed stable over the liver, and the negative used labile as before for two and one-half minutes; then for the same length of time the positive is placed over the sigmoid flexure, the negative labile as before.

The entire treatment occupies ten minutes and should be given daily until there is a decided improvement. This will vary from three to ten days according to the case. The treatments are then given three or four times a week for two or three weeks. As a rule, no evacuation follows until the next day.

It is essential that all laxatives be discontinued at the beginning of treatment. The patient is induced to assist the treatment by proper diet and attention to the calls of nature. Water is prescribed to be taken systematically, two glasses four times a day; the first thing in the morning, midway between meals and at bedtime, gradually increasing if possible to four glasses four times a day. Many patients are very reluctant to take even a moderate amount of water, which is no doubt partly responsible for this trouble. However, some who have persistently tried the drinking of water without the treatment have been obliged to continue taking laxatives.

When the trouble occurs from lessened secretion of the glands of the intestines, as is frequently the case from errors in diet, not eating a sufficient amount of coarse food, the habitual use of glycerin suppositories and enemas, the negative pole of the galvanic current is chosen. The metal electrode is covered with chamois skin, then thoroughly wet and inserted into the rectum. Ten milliamperes for ten minutes is turned on, which

is sufficient and is about as much as can be used with safety. The same general rules should be observed as with the other kinds of treatment.

In loss of sensation of the nerves of the rectum, which is generally due to neglect, the mucous membrane becomes tolerant and the feces are retained. For this the surging is given in the same manner as described above.

Constipation is also due to an irritated state of the rectum, namely, haemorrhoids, fissures and ulcers. These may all be cured by means of copper electrolysis, using a copper rectal electrode covered with chamois and thoroughly wet, placed in contact with the haemorrhoidal fissure or ulcer, as the case may be, and connected with the positive pole of the galvanic current. From five to ten milliamperes is used, according to the degree of sensitiveness of the part. The use of a covered electrode, dipped in a four per cent solution of cocaine, is a favorite method. The cocaine and copper both being electro-positive, are carried into the tissue simultaneously and anaesthesia is complete. Copper, being both germicidal and astringent, effects a cure. The irritation which follows and which varies with the condition of the patient, is best relieved by hot applications.

The use of Faradism, while much recommended by some writers, has not proven as successful in my hands as the technique given above.

#### ILLUSTRATIVE CASES

Case No. 1.—A young woman had been troubled with constipation for years, did not recall the time when she had not taken pills to move her bowels. She had tried the drinking of water and laxative diet as recommended by physicians, but with no result. At the present time she did not average one glass of water a day. She had been under treatment for neurasthenia for some time. Of late I had been giving the static head breeze, which I still continued to give, together with the wave current for constipation. She always complained of prickling over her ears while the head breeze was being given, and I noticed each day that her ears became somewhat red and swollen, but paid little attention to this, not an unusual symptom in patients taking the head breeze. However, she



came to my office one day with her face, ears and hands enormously swollen. The itching was almost intolerable. I should scarcely have recognized her had I met her upon the street. I advised a discontinuance of all treatments until the urticaria should subside. It was several days before she presented a normal appearance. She had had only seven treatments for constipation and fully intended to return for more, but to her surprise she found that she was entirely cured. Her general health was so much improved that she was able to resume her duties as teacher. After the cessation of treatment she continued to improve and six months later she told me that she weighed more than she had ever weighed and that she had never felt better in her life.

Case No. 2.—Mrs. G., aged 42, had chronic diarrhea all her life, up to within twelve years. Since that time she has suffered from constipation. Six years ago she had all the pelvic viscera removed and following that operation adhesions of the intestines formed, which caused her much pain, and her constipation was greatly aggravated. An operation had been performed for the breaking of adhesions, but the pain still persisted. She always depended upon strong cathartics, her usual treatment being large doses of Epsom salts, followed by enemas several times daily. She frequently used gallons of water before getting any relief. A mucous discharge always accompanied the evacuation. I gave her the electro-static wave current for six weeks, when the discharge of mucous ceased, the pain disappeared and she had daily evacuations without enemas. She continued the treatment, however, for three months, as she was greatly benefited by the tonic effect of the surgings. She went South and was gone several weeks. This was an unusual thing for her to do, as she had been unable for years to leave home even for a day. On her return she reported that she was just as well as when she discontinued treatment.

Case No. 3.—A woman, who had been troubled with constipation for years. Had been to a hospital and had had the sphincter dilated, which relieved her for a time. Had always depended upon lapactic pills and enemas to assist nature, which greatly amused her brother, a physician, and caused him to jokingly remark that it took just three hundred and sixty-five

pills to keep her bowels in condition for a year.

She began treatment with me. I insisted that the pills and enemas be discontinued, but after three days she became alarmed, as no movement of the bowels had taken place, and I allowed her to use an occasional enema. I gave her but eleven treatments with the static surgings. At the end of that time she reported her bowels as regular and that she had used neither pills nor enemas and believed that she was cured. She has never had a treatment since.

Case No. 4.—An interesting case was referred to me by Dr. F. Mrs. E., age 28, married six years, no children, had always been troubled with constipation. Since May last complained of a feeling of pressure in her right side, hypochondriac region, aggravated by eating, relieved by catharsis. The latter was difficult to induce, required the strongest purgative pills; even these failed at times. The remedy that had proved most effective was teaspoonful doses of Cascara Sagrada and Tincture of Nux Vomica in equal proportions. She had also used abdominal massage, glycerin suppositories and enemas, and later had been able to diminish the dose of Cascara and Nux Vomica to one-half teaspoonful. One-quarter teaspoonful failed.

I began treatment with the wave current every other day, as it was not convenient for her to come every day. At the end of the week she was very much discouraged, as there was no result perceptible. I then insisted upon a treatment every day and allowed enemas with the treatment. She soon began to improve and for two weeks had daily movements without enemas. I recommended a sensible diet, one especially of fruit, mentioning grapes. She took me too literally and lived almost entirely on grapes, eating them not only at mealtime, but also between meals. This caused an attack of acute gastritis. After recovering from this she returned, saying that she had been troubled with headaches. Fearing that these headaches were due to the treatments, she discontinued them. I am convinced that had she persisted she would have been cured.

It would be possible to go on enumerating indefinitely similar cases.

Many suffering from chronic gastritis, torpidity of the liver, hemicrania and other maladies have found that, proper elimi-

nation being secured, all their ailments vanished as snow before the sun.

This only establishes the fact that constipation is the primary cause of many other diseases.

To cure constipation is in a large percentage of cases to restore to good health.

It should be considered as great an achievement for the physician, as is a successful operation for the surgeon.

#### DISCUSSIONS.

Dr. Neiswanger said he believed the paper had great merit, as it brought up a most important subject, important because of the numerous reflex disturbances which result from constipation. We should expect this when we consider that the pudic and its various branches supply the genito-urinary as well as the rectal system, and any considerable irritation of one of these branches will produce a corresponding irritation in the neighboring organs. For instance, he had a case of chronic cystitis which had been treated with the ordinary remedies without results. The patient also suffered with hemorrhoids, which were treated, and the cystitis passed away as soon as the rectal irritation ceased. Another, a case of ovarian neuralgia which was very severe, yielded at once when the hemorrhoids were cured. The neuralgia was evidently reflex. Frequently women patients report having only one or two stools per week, and had come to regard this as an entirely normal condition. It is easy to see what will be the effect of the absorption of these poisonous waste products.

In cases of narcosis, relief is at once effected by stretching the sphincter, and children in spasms will often be relieved by this same process. These facts bear out the statement that there is an exceedingly close relation between the general nervous system and the structures in the lower part of the pelvis.

Dr. Burdick said constipation is a most interesting disease. He had a case about eight years ago, a very large man who had been healthy up to about six months previous, when he had been kept in bed for eight months. It was a case of arthritis deformans, and several physicians had pronounced his general condition very good excepting for the difficulty of

getting around. He became very much interested in the case and examined the man very carefully. He found an enormous tumor in the intestinal region near McBurney's point. The bowels had moved regularly once every day, but Dr. Burdick decided that the tumor was caused by foecal impaction. He decided to use a good old-fashioned remedy which our grandfathers used and gave the patient twenty grains of calomel and a half teaspoonful of jalap. There was a tremendous passage, the man nearly dying from the effects of the dose. On close inspection he noticed that there seemed to be some fig seeds and asked the patient when he had eaten them. The man remembered that he had not had any figs for about one year and a half, when a friend gave him a present of five pounds and he ate freely of them at that time. It is remarkable how the mucous lining of the intestines will become tolerant of these waste products. He regards the tongue as the best diagnostic symptom of retained foecal discharges. Nearly all other means of diagnosing these cases will fail at times, but the tongue is sure to be very thickly coated when the intestines are in this unhealthful condition.

In young girls constipation leads to distortion of the uterus and more or less painful inflammation, resulting in leucorrhea and kindred complaints. Physic is not satisfactory as an agent for dealing with these cases. They result from laziness—the patient is too busy to heed the call of nature. The operation of the bowels is almost as much a matter of habit as the taking in of food, and should be attended to with as great a regularity. The static treatment, besides its direct therapeutic effect, is also valuable in directing the attention to those parts. The psychological element as well as the muscular is brought into activity. He would expect that the sinusoidal with its gradual swelling and sinking of the current would be the ideal method of treatment. The interruptions used by Dr. Rice in the Morton Wave Current would have a very similar effect. The rapid interruptions would not be of so great value. The slow interruption produces alternate contractions and relaxations of the muscular coats of the intestines, which lead to an improved condition of the mucous lining. In one case he had found that folds of the mucous membrane in the sigmoid had formed a kind of valve and it

was first necessary to clip this. Afterwards the case yielded to electrical treatments. Sometimes the mucous membrane is in a chronic catarrhal condition. This usually yields to electrical treatment.

Dr. Rice asked whether Dr. Burdick had ever found that the static head breeze had produced any marked effect on the skin, as in the case which she had referred to.

Dr. Burdick did not think that this was due to the treatment. He had under treatment for constipation a young girl ten years old. The skin of her entire body turned fiery red with intense itching and was swollen to almost double the normal size. He told the mother that it was not scarlet fever but urticaria, and administered chloroform until the patient was about half asleep, when the redness began to subside. It was simply a case of hives due to intestinal irritation.

Dr. Rice replied that in her case the eruption did not begin until the constipation had been relieved and she therefore felt that it was due to the static breeze.

Dr. Neiswanger said that there was certainly an idiosyncrasy in different cases because some patients could stand the head breeze electrode comparatively near, while others found it unbearable at a distance of about three feet.

Dr. Burdick said that our static machines were indeed too powerful for electro-therapeutic work. Plate after plate had been added in order to fit machines for furnishing a current for X-ray work until the application is very powerful at the present time.

We must alter our methods as the output of machines has increased. Too many of us are using machines as we did when it had only a few plates. He had measured the output of a static machine with a high resistance galvanometer and found that the deflection was six milliamperes. Now we would consider it an ample treatment to furnish six milliamperes at one hundred and ten volts, and we must not be surprised that we get unexpected results when we furnish the same amperage at a great many hundred thousand volts. There should be some method to cut off the output when using the machine for therapeutical purposes. He had thought of pushing the equalizer into close proximity with the charging

brushes, but in many machines the equalizer was stationary and in others only a small amount of motion was possible.

Mr. Treadwell said that when the head breeze electrode is used we could hardly expect any considerable current to pass through the body of the patient, that the unfortunate effects mentioned above might be attributed to the current of charged particles of the atmosphere which were of necessity passing between the patient and the head breeze electrode. In some experiments, where he wanted a very light spark indeed applied to a subject, he had used a string connecting the patient to the prime conductor of the machine instead of the brass rod or chain ordinarily used. This string introduces such a large resistance that when the spark electrode is approached to the surface of the subject's body only a very minute spark can be obtained. Should a larger spark be desired some of the string could be made wet. Some such methods as this could always be used.

Dr. Burdick said that he had used a wet string in his experiments in measuring output from a machine. The only difficulty with his scheme was that the string would take fire.

Dr. Burdick said he was told of a complete alopecia produced by a very severe treatment from the head breeze electrode.

Dr. Neiswanger said that in some cases the hair seemed to grow more abundant.



# CLINICAL REPORTS AND DEDUCTIONS FOR GUID- ANCE IN TECHNIQUE.

BY O. SHEPARD BARNUM, M. D., LOS ANGELES, CAL.

Case 1. Epithelioma on right cheek; spot first appeared in 1895; was treated with paste and caustic, but never healed; ulcer  $\frac{1}{2}$  cm. by 1 cm. in diameter.

Ten applications of the Ray were made; every other day; ten minutes at ten inches; medium German tube; static machine; at end of one month no appearance of lesion remained.

Case 2. Dentist; act. 52; epithelioma on left cheek; had existed for 15 years; lupus patch measured 7 cm. by 12 cm.; one indurated spot near the center of the ulcer about the size of a quarter and attached to bone; plaster was applied last February; sloughing unsatisfactory; knife applied in April; wound did not heal and ulcer spread rapidly.

Treatment consisted of applications of Ray from rather low tube excited by static machine, every other day for three weeks, then an interval of two weeks necessitated by circumstances, followed by a series of six treatments covering two weeks. At the end of two months ulcer was entirely healed and no trace of cancer induration could be discovered.

Case 3. Keloid following the removal of a mammary sarcoma; tumor raised a half inch, was 12 cm. by 5 cm.

Treatment was continued by the Ray every other day for two months; the effect was immediately shown by paleness and rapid reduction in the size of the tumor. At the end of ten weeks there was no apparent tumor existing.

Case 4. Lady; act. 55; sarcoma of the vaginal wall following hysterectomy; posterior and lateral walls of vagina involved; marked induration of wall of bladder and urethral orifice. Applications were made per speculum with medium vacuum tube, in irregular series necessitated by circumstances; to date,—a period of two months—twenty-four exposures have been made and the effects are noticeable in that the urethra is now apparently free from the disease; indurations elsewhere have softened and been partially absorbed; general health has greatly improved and pain is almost entirely eliminated. Such cases can well be assured by proper use of the Ray, a longer life with infinitely more comfort.

Case 5. Laborer; aet. 55; injured knee by blow eight years ago, which resulted in a bursitis diagnosed as house-maid's knee; excision was performed two years ago; wound refused to heal; entire upper two-thirds of leg a honeycomb of tubercular sinuses; nine openings in all; discharge profuse and constant; pain severe; general appearance "rotten."

Twenty applications of the Ray were made; ten minutes, at ten and twelve inches, three times every week for one month; then twice weekly. Within a week the pain increased as the result of rapid increase of pus in the cavities, several of which were large and deep. At the end of two weeks the last abscess broke, with immediate and permanent relief from pain; during the first three weeks the discharge was greatly increased; the surrounding skin paled in spots and the diseased tissues became more circumscribed; after the seventh treatment the discharge began to lessen and I then for the first time cleaned all the sinuses with peroxide under pressure, and directed that it be done daily by the patient; before the end of the third week granulations were apparent and most of the sinuses had begun to heal from the bottom. After healing commenced I gave but one treatment per week; healing was exceedingly rapid, granulations healthy and abundant, and ninety days after the first application of the Ray every sinus was filled and every open ulcer healed. Skin is normal in appearance; in fact, a perfect cure resulted.

Like all operators, I have been laboriously seeking for some standard of technique, and, like them all, am still far at sea. My experience warrants the conclusion that idiosyncrasy of the patient is wonderfully important in the exhibition of the Ray, and though standards of current quantity, intensity, power of penetration, and degree of vacuum will be of great value, they will never allow any but the expert to be the final judge of method of treatment. At best the course of even the experienced operator must be on a precarious midway between the devil and the deep sea,—the possible involvement of healthy tissue while attempting to destroy an epithelioma for instance, on the one hand, or ultra-conservatism with resultant negative effects, on the other. From an experience covering some years, I have formed the following conclusions and make them the guides in my work, though in many instances they have to be modified to apply to the case in hand. Exceptions are the



rule in my work in X-ray therapy at present, and such conclusions as I have accepted must be modified here and there to met the emergency.

1. Seldom, if ever, is a dermatitis necessary. The effect of the ray is a tissue change which occurs without reference to inflammation of the overlying skin.

2. After an X-ray tan appears there is little or no danger of a dermatitis, even from excesssive exposures. An X-ray tan should be secured in cases where deep tissue effects are desired.

3. The less the number of exposures to secure the reaction (*rayism*) without danger to the other parts, the better. By *rayism* I mean the profound effect of repeated rayings,—not necessarily an acute inflammation.

4. Idiosyncrasy to the ray is very great. Conservatism is essential until the personal peculiarity is well known.

5. In primary lesions it is best to secure *rayism* as speedily as possible, consistent with safety to the surrounding parts.

6. Secondary or recurring lesions of malignant nature are much more stubborn to treatment than primary, and should be rayed much more forcefully.

7. Varying obliquity in direction of the ray as focused on the lesion is desirable, and should be especially used where the ray would enter the cranial cavity.

8. The cumulative effect of the ray is very marked, and may be noticed several months after treatment has ceased. This is especially so in cases where the treatment was with high tubes for *rayism* on deep tissues.

9. In strictly superficial epitheliomata a comparatively low tube is best,—one by which good definition of bones of hand is had at two feet distance.

10. Use a varying high tube for all indurated spots of any size. Penetrability of the ray must increase in geometrical progression with the thickness of the diseased tissue.

11. Distance of tube from object should vary,—perhaps between seven inches and twenty inches.

12. To cause hyperaemia and induce granulation use a medium high tube at considerable distance, excited either by a static machine or coil.

13. After a severe reaction from the ray resulting in broken down tissue, give the spot a good, long rest before attempting to use the ray for healing purposes.

14. Conservatism is desirable in every case only to the point of knowing particular features to be avoided. Be sure you know your tube and patient and then *hit hard*. Break down all the affected tissue during the very first series of treatments.

15. In treating typical epitheliomas break down the induration completely so that all involved tissue may be discharged through the ulcer. Avoid too rapid absorption of breaking down diseased tissue. Get an open ulcer over a malignant growth if at all possible,—using plaster or knife if necessary.

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#### THE VALUE OF X-RAY THERAPY RECOGNIZED BY A MEDICAL JOURNAL.

The X-ray operator is no longer regarded as an unreliable enthusiast. The report of cures of malignant growths in the medical journals, though received at first with caution, have been indeed early accorded their true value. A number of such reports have been published in the different New York journals, particularly the Medical Record. In its issue of July 19, in commenting on a paper of Dr. Allen, this is the closing paragraph:

“Radiography as utilized in the manner described by Dr. Allen is a valuable remedial agent, if not actually curative in its action. The fact, too, must be remembered that the method is yet in its infancy, and the reasonable expectation may be found that in future more striking results will be obtained from its use than have been obtained in the past.”

This is certainly a warm recognition when we consider the results already published in its columns. Dr. Allen prefers a static machine. He holds that focus tube dermatitis should enter but little into the question, as its importance is far outweighed by the gravity of the disease to be eradicated. The exposures, however, should be discontinued at the first sign of dermatitis, in order to avoid severe burns. Other forms of treatment could be given at the same time.

## Editorial.

### A NEW EDITORIAL STAFF.

The Journal has the pleasure of introducing to its readers the following new editorial staff of physicians:

J. Rudis-Jicinsky, M. D.

G. G. Burdick, M. D.

Emil H. Grubbe, M. D.

Russell H. Boggs, M. D.

Noble M. Eberhart, M. D.

A. Decker, M. D.

Reports of their work appear in past issues of our publication, as well as in other prominent journals. Our readers are therefore familiar with their researches in Electro-Therapeutics.

Drs. Burdick, Grubbe, Boggs and Rudis-Jicinsky read interesting and important papers before the last meeting of the American Roentgen Ray Society. Dr. Decker contributed an important article to our journal in the September issue of last year. Dr. Eberhart's article in the present issue speaks for itself.

A progressive journal should give all the most advanced work in the field of which it treats, but it should always stand for a wise conservatism in the adoption of new methods of treatment. It must always be borne in mind that the investigator may be possibly unduly optimistic and that the results which he has obtained would not be reached except in special cases. At the same time a spirit of conservatism alone may develop into mere negation which simply blocks the legitimate progress of careful research work. This new editorial staff will accomplish the double purpose of assuring the scientific conservatism to our columns as well as a healthy spirit of research in the application of electricity for therapeutic purposes.

W. F. BUTTERMAN, M. D.,  
Editor.

## Editorial.

The paper of Dr. Eberhardt will doubtless evoke considerable discussion and may be considered too radical by some.

It is given only as a report of progress and other clinical cases will furnish material for a thorough trial of the X-ray as suggested by Dr. Eberhardt's results.

### MINUTES OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

Dr. Burdick in the chair.

Minutes of the previous meeting read and approved.

Resignation of Dr. Street as treasurer read.

Moved and carried that the resignation be accepted.

Dr. Grubbe was elected to the office of treasurer.

Following by-law was then adopted:

Associate members shall be allowed all the privileges of the floor and all other privileges of the society, excepting the holding of executive offices.

Dr. Eberhardt read a paper on "The X-Ray in Gleet." It was discussed by Drs. Neiswanger, Street, Burdick.

Dr. Rice read a paper on "The Treatment of Constipation by Electricity." Paper discussed by Drs. Neiswanger, Street, Burdick and Mr. Treadwell. Society then adjourned.

### NOTICE.

The February meeting of the Chicago Electro-Medical Society will be held in room 301, Schiller Building, on Tuesday, February 24, at 8 o'clock p. m. Dr. C. S. Neiswanger will read a paper entitled "Galvanism in Pelvic Diseases of Women."

## RESULTS AND TECHNIQUE IN TREATING EPITHELIOMA WITH X-RAYS.\*

BY EMIL H. GRUBBE, B. S., M. D., CHICAGO.

Professor of Radiography, X-Ray Therapeutics and Electro-Physics, Illinois School of Electro-Therapeutics; Chief Radiographer, Illinois X-Ray and Electro-Therapeutic Laboratory; Professor of Electro-Therapeutics, Hahnemann Medical College.

Since the early announcements of the potent and almost miraculous effects of X-rays upon disease the medical profession has made some remarkable advances. The fact that these advances have been made through different and independent channels attaches more than ordinary interest to the subject. It has been repeatedly said that medicine is yearly advancing toward a more scientific basis and is gradually losing its empirical nature. Within the last few years electricity has had much to do with the scientific development of medicine, and no one particular part of electricity has brought out more practical applications or more encouraging results than the study of X-rays.

In this connection it is also interesting to note that in the history of medicine all improvements, discoveries and treatments of a radical nature have always met with drawbacks and adverse criticism by those who consider themselves conservative. The X-ray was no exception to this, and even to-day, after undisputed clinical experience has demonstrated its therapeutic value in certain diseases, we have those who will not believe. To permanently establish its claims, therefore, the X-ray must pass through the same crucial tests and stages to which other therapeutic agents have been subjected. However, the favorable results obtained by thousands certify only too clearly to the fact that, as a valuable addition to therapeutics, its position has been well established.

While we have no specific in rational medicine, we take it for granted that there is no longer any doubt as to the practical value of the X-ray in the treatment of certain forms of

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\*Read at the meeting of the American Roentgen Ray Society, Chicago, December 10-11. With full discussions.



**This cut shows mode of treatment of epithelioma. The healthy tissue is protected by tin foil against burns.**

disease. Probably in no disease has the X-ray demonstrated its peculiar power better than in the treatment of epithelioma. Much has already been written about the use of the X-ray in the treatment of this disease—in fact, some may say that this subject has been thoroughly exhausted; nevertheless, personally, we realize that, due to the vastness of the subject, it will be impossible for us to comprehend in this paper the entire field of X-ray therapy as applied to this particular disease.

We must not forget that, although we have worked with the X-ray as a therapeutic agent for a number of years, we do not yet know just what the action of this agent is upon the tissues of the body. Much remains to be done. Scientific investigations of the many details of the different methods now in use are to be encouraged. Those of us who are actually in the field deplore the fact that too much has been said concerning this treatment without weighty consideration, without the application of scientific proofs, and we may say that the apathy of the medical world towards accepting the results of this treatment is largely due to the haphazard and indiscriminate methods of using the X-ray, which have been productive of nothing but immature and unscientific deductions. Indeed, it seems that those who are in a position to know least about the X-ray from a practical standpoint are loudest in talking about it.

Of course difference of opinion is always allowable, but much of the difference of opinion relative to this subject arises and is primarily due to the fact that there is lack of scientific knowledge in possession of those who make attempts at working in this line.

Concerning the methods of treating this particular disease there seems to be a wide difference of opinion as to their relative value. Several methods have been announced, and each of these has its advocates. Some have recommended the use of a low vacuum tube, while others with equal force have lauded the value of the high vacuum tube; still others have stated that either a high, medium or low vacuum tube could be employed with equally good results. In other words, that no distinction need be made between the vacua of tubes used for this purpose. We may analyze these various methods as far as they go.

Observation teaches that most X-ray workers treat their cases after a stereotyped method, using little or no reason or logic. Common sense certainly would teach one that there must be a decided difference between the rays emanating from a low vacuum tube as compared with those coming from a high vacuum tube. Indeed, there is a very great difference. When the one is proper for a certain case to use, the other certainly would be very improper. Therefore the recommendation of the indiscriminate use of either the high or low tube is simply a makeshift. No valid reason can be given for such procedures. The serious objection to this method, then, is that it is not exact, and the study of the X-ray will not be advanced very rapidly by the use of such methods. We wish also to emphatically refute the statement made by some that the high tube is generally to be preferred in the therapeutic uses of the X-ray, "because it is not as dangerous as the low tube." Nothing more fallacious than that can be announced. Notwithstanding the plausibility of the argument advanced by those who use the high tube exclusively, that only such a tube should be used, because they "have obtained good results," we claim that this distinction is based upon an incomplete acquaintance with the dangerous as well as the good side of X-ray treatment. We do not dispute the fact that a high vacuum tube can be used and good results obtained, but it certainly is not proper to use a high tube when a low tube will answer the purpose, and that, too, without the accompanying dangers incident to the use of the high tube. Only those who have had sad experiences with the use of the high tube can appreciate the danger to which we subject patients in every exposure. A tube whose vacuum is just high enough to penetrate the tissues to be affected should always be used. A higher vacuum would certainly be contraindicated, for if the rays penetrate the deeper tissues, these also will be markedly affected, although they are not pathologic and it is not desired to treat them. Inflammation of deep tissues, as well as surrounding tissues, is to be avoided. Marked irritating effects have been produced upon the brain by treating an epithelioma or a lupus of the head with a high vacuum tube.

In view of these facts, and many more, we must con-



scientifically decry the indiscriminate use of the high tube.

It may be argued, since the matter of studying the vacua of tubes is a relative one, or, rather, a subject which involves the personal equation, that we have no right to oppose any method unless we know all the particulars pertaining thereto. Be that as it may, we all admit that in determining the relative vacuum of a tube we have no absolutely accurate method. Probably the simplest method is to rely upon the ability of the tube to back up a spark gap between the prime conductors of a generator. We realize that this method is not at all accurate, depending so much upon physical conditions and individual experience, but nevertheless the simplicity of this method commends it, and with a fair amount of study it will be quite useful. According to this method the writer calls a low tube one whose vacuum is equivalent to an air spark gap of less than three inches. That is, the current would rather excite the tube, giving distinct and clear hemispheres in the bulb, then jump over an air space of three inches between the prime conductors. Such a degree of vacuum we use and recommend in the treatment of epithelioma.

A few brief statements with regard to apparatus. It may be said that since good results have been reported from the use of both static machines and induction coils, as X-ray generators, that either is equally good for X-ray therapeutic work. Having used both forms of generators, and that, too, of different sizes, almost daily for several years, we have found that the greatest drawback to the use of the static machine is our inability to vary or control the strength of current. On the other hand, in the coil the quantity of current can be regulated at will. We also can pass through the tube any quantity of current irrespective of the vacuum when a coil is used. The writer has made use of quite a number of interrupters on the coils, but his preference is the rapid mercury turbine interrupter attached to a twelve-inch coil, taking from one and one-half to four amperes in the primary on the 110-volt circuit. In using a coil connection may be made to the tube without the use of a spark gap in series; however, some tubes will excite better when one or more spark gaps are used. In using the static machine it is always advisable

(due to the fact that we have very low amperage) to use at least two series spark gaps between the machine and the tube.

This arrangement of series spark gaps will overcome many difficulties usually met with in making fine adjustments of vacua. After all, however, it is not so much the exciting apparatus which is the vital part of an X-ray outfit, but it is our ability to maintain a constant vacuum in the tube, which is the factor of greatest importance. Ideal results can only be expected and obtained when the tube is so controllable in its vacuum that we can duplicate the treatment at each sitting. To prevent ourselves being charged with commercialism, we must refrain from writing more specifically about apparatus.

A perfect understanding of definite dosage of X-rays is still to be desired. Only when we have compared results extending over quite a period of time and covering many cases can we establish a rule as to the controlling factors, namely, quality of tube, distance of tube from parts treated, time of exposure, frequency of exposure, exciting apparatus.

It must also be remembered that careful individualization is of paramount importance. This cannot be dwelt upon too much. We must not forget the fact that some individuals may have more than one disease at one time. Patients have been brought to us who were supposed to have epithelioma or lupus, when in reality they also had syphilis. One of the most important things to consider, then, if the efficiency of the X-ray is to be judged, is a proper diagnosis.

There is reason to believe that in nearly all cases of so-called epithelioma or lupus growths which have been under X-ray treatment for some time without showing and marked signs of improvement that we may suspect another condition as existing concomitant.

The time of exposure, aside from the factor of idiosyncrasy, which undoubtedly must be considered, depends primarily upon the intensity of the X-ray. The quantity of rays developed in a tube depends upon the amperage of the generator. If a powerful ray is used the time of exposure should be short, and when a weak ray is used exposure may be relatively long. According to the nature and severity of

the case the use of a strong or weak ray would be determined. Since it is our aim to produce dermatitis in all these cases, treatments are given daily from the beginning, exposure ten minutes, with the tube placed from four to six inches from the affected part. Patients are treated in this manner until a certain response is obtained, as indicated by the development of redness, heat and itching in the parts exposed, when treatments are stopped for from two to seven days, according to the degree of reaction, after which we expose the patient again to the same kind of rays. After the first reaction there is usually less liability to active dermatitis.

During the administration of the treatment all parts not to be affected by the rays are protected by a mask of thin sheet lead, which has been especially made for this purpose. We wish to emphasize that the occurrence of the symptoms which result after X-ray exposure, and which have been termed "dermatitis," or "burn," do not retard the progress of cure. In all unbroken conditions a continuous presence of dermatitis is of great value and will accomplish more than when we do not produce it. In all open or ulcerated conditions we need not stop at producing a simple dermatitis; in fact, then we are just beginning to do the condition good, and by continuing treatment until an actual burn develops, all will be surprised at the good results.

The most striking illustrations of the value of the production of dermatitis are furnished by patients themselves. It is not an uncommon thing for us to hear patients who have been burned most loud in expressing their belief in the value of the X-ray treatment, the results to them are so pronounced. In considering the conditions under which dermatitis may develop in any individual, it may be stated that observation teaches that not only do different persons differ as to susceptibility, but the same individuals' susceptibility will vary under different circumstances.

It is important in this connection to bear in mind the fact that when we use the X-ray as a therapeutic agent we are not necessarily limited or confined to its action alone. In many cases the X-ray treatment may not be deemed alone sufficient in bringing about favorable results, and, although

many cases are susceptible of cure with it alone, any adjunct treatment, such as constitutional medication and local cleansing, are considered imperative. Proper general or systemic treatment is as much indicated when the patient is under X-ray treatment as at any other time. Precautions should be taken in regard to reasonable care of the person in the interim between treatments.

We therefore lay great stress upon the necessity of treating the individual and not the disease.

In giving a summary of cases under this treatment they should be considered relatively. All things are relative. Since using the X-ray therapeutically the writer has treated a total of 103 cases of epithelioma. Of this number 61 cases occurred in men and 42 in women. Our experience, then, would lead one to believe that this particular disease is more prevalent in men than in women.

Realizing that tabulated statistics are always difficult of understanding when read, and at best are always dry, as concise a summary as possible will be given.

In about one-half of the cases which have come under our observation the disease has been upon the surface, and therefore very readily brought under direct influence of the X-rays, and the progress of the condition could be observed frequently. In the rest the disease has been in internal parts of the body, and, unfortunately, these areas are neither directly accessible for X-ray treatment nor for observation. The clinical investigations of all these cases were conducted in as rigid and scientific a manner as the individual case permitted. No stone was left unturned in order that definite conclusions might be arrived at.

The cases range in age from 8 to 92 years. The majority (68 cases) were over 40 years of age. As a classification, based upon the length of time the disease has been active, is unscientific and at best is only comparative from a narrow point of view, we deem such a classification unnecessary in this summary. The average length of time under this treatment was four months. However, some cases were pronounced symptomatically cured after taking less than one month's treatment. On the other hand, several of the more severe cases were treated more than six months, and in one

case the treatment extended over eighteen months. To detail all the cases, or even a small number of them, would take up more time than is allotted; therefore we shall group them according to location. No effort is here made to distinguish between primary or post-operative cases, because if the X-ray treatment is indicated it will bring about favorable results in either class.

In 76 cases the disease was located in some portion of the head, and involved only the upper part of the body. The part most affected was the mouth and its adjacent tissues. Under this heading there appear 68 cases. In 8 cases involving the eye results considered good in 5, poor in 2, failure in 1. In 13 cases involving only the tongue, results considered good in 7, poor in 2, failure in 4. In 5 cases involving the vagina, results good in all. In 1 case involving the bladder, results failure. In 20 cases involving the fauces, results fair in 6 (disease seems to have been checked), poor in 6, failure in 8. In 2 cases involving the uterus, results good. In 22 cases involving nose and cheek, results good in 10, poor in 7, failure in 5. In 21 cases involving one or both lips, results good in 10, poor in 7, failure in 4. In 11 cases involving other parts of the body not mentioned in the above, results good in 5, poor in 2, failure in 4.

Although we have treated a great many cases of epithelioma of the fauces, and all, without exception, have been benefited at the beginning of the treatment, we frankly admit that we cannot report any permanent cures. Possibly failure to obtain cures in these cases was due to the vital location or too extensive progress of the disease before coming under this treatment.

Of course it would be considered remarkable if all those included in this whole list got well or even improved. Due to the fact that the treatment was not undertaken early enough, some have died from infection or general carcinosis; others have died from some inter-current disease, such as pneumonia, heart failure or some form of renal trouble. Some we have lost track of, so that the final results, whether good or bad, cannot be determined. For sake of argument, the latter have been classified among those who did not benefit from this treatment.

In the attempt to form an opinion as to the percentage

of cures obtained by this method many obstacles are met. While it is impossible for any one to produce figures concerning this which would be exact, we can state that in the majority of cases our efforts have been successful. It is only fair to assume, considering the length of time these patients have suffered, and that the great majority were extremely far advanced in disease, many were pronounced incurable by other methods; many were recurrences; in others the disease was situated in localities where most unhygienic and unideal conditions prevailed; that such results could not have been obtained by any other treatment.

We do not claim that all cases favorably reported are absolutely cured, but we do claim that no evidence of the disease was discernible in all the cases discharged. We choose to call these symptomatic cures. It can be stated positively, however, that in all uncomplicated cases of superficial epithelioma, where the diagnosis has been made early, the results due to X-ray treatment have been such as to warrant the use of the word "cured" in its fullest sense. And in curable cases the X-ray is as nearly specific as any therapeutic agent in use to-day.

Taking for granted that in the majority of surgically recurrent cases the return of the trouble is due to a proliferation of epithelial cells from the original or primarily affected area, every surgical case should be placed under X-ray treatment within from one to three weeks after operation. Only by the early and vigorous use of this method can we hope to forestall more serious trouble.

We have not exhausted this subject. The praises due the X-ray could be prolonged almost indefinitely, the results have been so uniformly good and numerous.

No matter what may be the ultimate answers to the many questions which vex the medical professions to-day concerning the X-ray, it must be conceded that this force in the treatment of epithelioma is a pronounced success, and a knowledge of its merits should, therefore, be more thoroughly disseminated.

The co-operation of the profession in general should be given in order that humanity may reap the benefits.

Chicago, Ill.

## DISCUSSION ON DR. GRUBBE'S PAPER.

Dr. Clarence E. Skinner, of New Haven, Conn., does not believe that it is necessary to produce a dermatitis to cure an epithelioma, although in the majority of cases the cure is hastened by the production of some dermatitis.

Dr. Jefferson D. Gibson, of Birmingham, Ala., in speaking of treating lesions about the head with the X-ray, said that it is better to ray antero-posteriorly than laterally, as there is not so much danger of causing untoward complications. Too intense raying is liable to produce too much detritus, which is liable to retard the progress of the case, or even destroy life. The treatment should not be pushed beyond the point of browning the skin, or possibly a burn of the first degree.

Dr. John C. Pitkin, of Buffalo, N. Y., said that a large percentage of these cases, when exposed to the ultra-violet ray after the X-ray has done all it can, will take on a new process of repair and will eventually end in recovery. Others will not do well until they are put back again on the X-ray treatment.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia., would not produce dermatitis in every case, although he would produce tanning in the internal cases if necessary. The patient should never be exposed for a greater length of time than is absolutely necessary for the work in hand.

Dr. Gordon C. Burdick, of Chicago, said that a dermatitis is one thing and a necrotic X-ray burn is another. We should tell the patient that there is liable to be some soreness in order to avoid trouble later on. Some people have an idiosyncrasy as to the X-ray and are easily burnt. Meddlesome interference will make these cases worse. In place of putting ointments of any kind on an X-ray burn, expose it to the air until vesication has taken place, then apply benzoinated lard and a protective dressing to prevent infection and to take care of the discharge. After three or four weeks the ray can again be applied, and instead of aggravating the trouble it will stop the discharge and promote healing. It is not essential to burn, and it should be avoided if possible. With reference to malignant disease, he said that any case of carcinoma brought in within reasonable time,

before extensive metastasis had formed, will yield symptomatically to the X-ray treatment. Some of his cases have remained so cured for over two years without any recurrence, although a recurrence is still possible.

Dr. E. J. Brown, of Decatur, Ill., believes in producing dermatitis. He finds that it is much easier to produce dermatitis on the body than upon the face, and that the former is also much more difficult to cure. He prefers to give his treatments in relays. He gives six or eight treatments until dermatitis results, and then stops. He cited a case of extensive rodent ulcer of the eye, in which he has given four relays of treatment. After each relay he allowed the surface to heal until at the present time it is healed up almost entirely. It permits of perfect control of the case and prevents severe burning. Furthermore, instead of trying to diminish the discharge, he makes every possible effort to increase it, believing that it favors a healing. X-ray work does not interfere with either the cosmetic effect or the function of the tissues treated, and that is more than can be said of surgery.

Dr. Grubbe, in closing, said that by dermatitis he did not mean burning; merely the production of heat and itching. He found that he got better results when he produced dermatitis than when he did not. He makes it a rule to tell everyone who is exposed to the X-ray for any reason that a burn is liable to result. It saves one a great deal of trouble in many cases. Improper care of the burn by the family physician is more often responsible for the bad effects of the burn than the burn itself. The parts should simply be kept clean and they will heal up quite rapidly.





**"X-RAY TREATMENT FOR TUBERCULOSIS."**

REPORT OF FOURTEEN CASES TREATED TWO YEARS AGO UNDER  
PECULIAR CONDITIONS.

By Doctors Boido & Boido, Tucson, Ariz.

This town has about 12,000 inhabitants, of whom some 5,000 are Mexicans. It is situated on the main line of the Southern Pacific Railroad in Southern Arizona, between El Paso, Texas, and Los Angeles, Cal. It has an altitude of 2,300 feet above sea level with a very dry and warm atmosphere. It is an ideal climate for people affected with lung troubles, and many come to spend the winter months with us, although we consider the summer months of more benefit to them. It is a fact based on extensive statistics compiled chiefly in this town and the surrounding country during several years' practice, that the Mexicans are becoming more affected with tuberculosis than in former years. Besides, when a Mexican youth ranging between sixteen and twenty-five years of age contracts the disease he seldom lives over one year after the first symptoms appear, and many die within the first five months of their trouble. This is probably due to the fact that the majority are poor and hence live in squalid surroundings, are badly nourished and have no money to buy drugs.

The fourteen cases we report in this paper are all Mexicans afflicted with pulmonary tuberculosis in different stages of the disease, as proved by microscopical examination of the sputum and the injection of their sputum into the peritoneal cavity of guinea pigs, which died in less than six weeks, of tuberculosis. These cases, therefore, were treated under peculiar conditions, that is to say, subjects that as a rule have no resisting power to the ravages of the disease and quickly succumb to its effects. The technique employed in the treatment of these cases is a 16-plate static machine, using a medium hard 30-35 German tube, with the idea of producing a dermatitis as soon as possible in each case, and then resting for a few days till the latter got well, and then beginning over again. We have used the X-rays for the last three years in different conditions and have not yet found a severe case of dermatitis that did not heal spontaneously in a few days. We believe from experience in the treatment of these cases that the X-rays which produce a dermatitis are the real therapeutic rays

that give the most benefit to the patients. In treating these cases the tube was held between three and four inches from the chest, anteriorly and posteriorly, employing five minutes for each side.

After two or three treatments ten of the fourteen cases were relieved of the pain in the lungs, although the daily fever was the same.

CASE I.—L. W.; Mexican girl, age 15; pale and sparingly built. No history of tuberculosis in her family. About a month and a half ago began to complain of pain over left scapular region with cough and afternoon fever, loss of appetite and six pounds loss in weight. Came to the office on Jan. 15th, 1901, with a hacking cough and raising a little bright red blood. Microscopical examination of her sputum revealed a few scattered tubercle bacilli, and the physical examination showed a typical case of incipient tuberculosis affecting the upper part of the left lung. The X-rays were applied for the first time on January 16 for ten minutes, using a medium hard tube. After seven daily treatments she developed a slight dermatitis in the upper part of the chest, and a rest was taken for three days. She was also given from the start a Codeine mixture and an iron tonic. Her temperature the first four days was 102, 102, 103, 102. In the next ten days her temperature ranged between 100 and 101, and in the next ten days her temperature dropped to 99. This girl was treated for three months, receiving during that time fifty-two treatments with the X-rays and gradually improved and gained ten pounds in weight, and is to-day practically well. Six months ago a guinea pig was injected with her sputum and it is also alive and well.

CASE II.—Mrs. C. G., age 27; Mexican; married and has one child 5 years of age; two sisters died of consumption, but mother and father are alive and well. Came to consult us on Jan. 28, 1901. Had been sick about six months with cough, daily fever, night sweats; had lost twenty-five pounds during that time; loss of appetite and pain over both scapular regions. On physical examination showed both lungs in the third stages of tuberculosis with a cavity in left lung. On microscopical examination of the sputum it revealed large numbers of tubercle bacilli and also streptococci. She was put on the X-ray treatment the same day and some auxiliary

medicines for the distressing symptoms. She received forty X-ray applications in two months with no results, having a temperature of 103 to 105. At the end of two months she passed on to another doctor's care and finally died in October of the same year.

CASE III.—S. C., age 19; working in the railroad shops; Mexican, with negative family history; had been pronounced incurable by his physician. Came to us on Jan. 10, 1901, complaining of cough with a bloody sputum at times, night sweats, pain over right lung, loss of appetite and some eight pounds in weight during the last two months, that being about the time when he first began to get sick. Temperature on this day was 101. On microscopical examination of the sputum a few tubercle bacilli were found. This case was pronounced by us as an incipient one and placed at once on the X-rays and some deep breathing exercises with the aid of the nebulizer. The pain disappeared from the right lung after the third treatment with the X-ray, and the temperature began to decline after the sixth. He was treated for three and one-half months, receiving during that time fifty-eight applications and three burns with the X-rays. He gradually improved and gained ten pounds in weight and is to-day driving a freight team to the mines. Three months ago a guinea pig was injected with his sputum and it, also, is alive and well.

CASE IV.—Mrs. L. H.; married, with five children; age 38; with negative family history; Mexican. Came to consult us on Feb. 10th, 1901. Previous health good until three months ago she began to have a cough, loss of appetite, night sweats and a pain over left shoulder. Sputum at times streaked with blood, and a few tubercle bacilli were found with the microscope. She had lost fifteen pounds in the last three months and lately had become hoarse with tuberculosis of the larynx. Her temperature was 101. She was put on the nebulizer and the X-ray with a Heroin mixture for the cough. This case was easily affected with the rays at first, having developed a dermatitis after the third treatment which lasted ten days, but not so afterwards. She was treated for three months and received during that time forty applications with a slight improvement. When she discontinued her treatments on account of financial reasons, she still had a temperature of 99 and was some hoarse. She has not gained any in weight at present;

coughs, can hardly speak above a whisper and it is certainly only a matter of time, and short at that, before she dies. The only thing that can be said in favor of this case is that the short time that she was treated prolonged her life beyond the usual limit that the majority of these Mexican lungers live. She is still alive and goes about.

CASE V.—Miss C. B.; age 19; Mexican, with a negative family history; came to consult us on Feb. 6th, 1901, for a cough with a bloody streaked sputum at times; afternoon fever, loss of appetite and some ten pounds in weight during the last three months, this being about the time when she first took sick. Her previous health had always been good and her occupation being a seamstress. On examination we found that her left lung was affected and had some doubts about the right one. The microscope revealed some tubercle bacilli, and her temperature on the above date was 102. She was placed on the X-rays and some auxiliary remedies for the cough and fever for a period of two months, receiving during that time twenty-eight applications of the X-rays. She was burnt twice during the two months, but did not improve very much; her temperature ranging between 99 and 101. She passed on to another doctor's care for a while and finally went to Hermosillo, Mexico, where she died last April, 1902.

CASE VI.—P. S.; Mexican young man aged 19; blacksmith; had one brother die of consumption two years ago, but otherwise family history is negative. Came to consult us on March 3d, 1901, for a cough with bloody sputum at times, loss of appetite and a loss of some twelve pounds in the last six weeks, which was about the time his sickness began. No tubercle bacilli could be found with the microscope on several examinations, but a guinea pig that was injected with his sputum died in two weeks of tuberculosis. His temperature on the above date was 101. This boy was treated for four months with the X-rays and the nebulizer, receiving during that time sixty-five treatments and five burns. His temperature became normal after the first month's treatment and his improvement was noticeable in every respect, gaining fifteen pounds at the end of four months. The boy is well to-day and working at his trade, and two guinea pigs that were injected four months ago with his sputum are alive and well to-day.

CASE VII.—Mrs. A. P.; Mexican girl aged 22; family history negative. Came to consult us on Feb. 12th, 1901, for lung trouble that began two months ago with cough, fever, etc. A few bacilli of tuberculosis were found in the sputum. She had lost ten pounds in the last two months. She was treated for four months, receiving in that time fifty-two treatments with the X-rays and some auxiliary remedies. The temperature became normal in the second month and improved gradually. She is now working in a dry goods store, apparently well, having regained her loss in weight. Two guinea pigs injected four months ago with her sputum are still alive.

CASE VIII.—Mr. P. I. G.; Mexican farmer, age 35; family history negative. Came to consult us on Dec. 28th, 1900, for lung trouble of three months' standing. Has lost fifteen pounds during that time and now has a temperature of 101 in the afternoons, with cough and a bloody sputum at times, night sweats, etc. No tubercle bacilli could be found in the sputum on different examinations during the month of January, 1901, and was only treated with the nebulizer and auxiliary remedies with a slight improvement. On February 3d a few tubercle bacilli were found in a greenish sputum expectorated in the early morning. He was placed on the X-rays for three months and the afternoon temperatures disappeared, but still had left some cough in the mornings. He gained five pounds while being treated, but lost them again. He came to the office two weeks ago and has not had any more fever since he stopped treatment; feels well; has not increased in weight and has some cough at times.

CASE IX.—Miss D. M.; Mexican young lady, age 22; family history negative. Came to consult us on Dec. 10th, 1900, for cough, fever 100, loss of appetite and a loss of eight pounds in the last month and a half, when her sickness began. A few tubercle bacilli were found in her sputum and she was put on the X-rays for three months, along with some auxiliary medicines for the cough, which was quite troublesome at first. She improved slowly, but after the end of three months, when the treatment was stopped, the fever disappeared, as well as the cough, and is to-day apparently well, having gained fifteen pounds.

CASE X.—P. R.; Mexican woman, married and the mother of three children; age 30; family history negative. Came to

consult us on March 6th, 1901, for cough with a bloody sputum at times; temperature 100; loss of appetite and a loss in weight of ten pounds during the last two months. Has been sick about two months. Tubercle bacilli and streptococcus were found with the microscope. She was treated two months with the X-rays and symptomatic medicines with little or no improvement. After resting one month she noticed some improvement in the cough and a gain in her appetite and she decided to take more treatment. She was again placed on the X-rays for a month and a half more with no marked improvement. Three months later she came back to the office and stated that she felt well, only her weight was the same. We saw her again one month ago and still she lacked ten pounds in weight and had a slight cough at times. No tubercle bacilli could be found in her sputum, although we have advised her to continue her X-ray treatment again.

CASE XI.—Y. S.; Mexican laborer, age 45; family history negative. Came to the office to consult us on April 4th, 1901, for cough, pain in the right lung, fever every afternoon and a loss in weight of twelve pounds in the last two months; has been sick about three months. On examination of the sputum it was found to contain a few tubercle bacilli. His temperature was 101 F. He was treated for three months, receiving forty-five applications of the X-rays and some auxiliary medicines. The temperature became normal during the second month and the cough at the end of the third month, disappeared. He gained five pounds in three months and has apparently been well ever since. He is at present working in some mines about forty miles from this city.

CASE XII.—F. C.; Mexican farmer, age 22; family history negative. Came to consult us on April 12th, 1901, for cough, hemorrhages from the lungs, afternoon fever, etc. Has been sick about six months, having lost some twenty-five pounds during that time. On physical examination a cavity was found in the left lung and the right lung also affected. On microscopical examination of the sputum it was found to contain large numbers of tubercle bacilli and chains of streptococci. It was a clear case of tuberculosis in the third stage with a temperature of 103 on the day of examination. This patient was treated for three months with symptomatic remedies for the cough, fever, etc., and received forty-two treat-

ments with the X-rays with no beneficial effects, having been burnt on three different occasions. He died soon afterwards, having been sick eleven months.

CASE XIII.—Y. P.; Mexican girl, age 19; family history negative. Came to consult us on April 25th, 1901, for cough, pain in the chest, afternoon temperature and a loss in weight of eight pounds in the last month and a half. Her temperature on the above date was 100, and coughing and raising a sputum streaked with blood. Has been sick about seven weeks. The microscope revealed a few tubercle bacilli after the second examination. She was treated four months with the X-rays and some auxiliary medicines. She received fifty-two treatments with the X-rays and was burnt four times. The temperature became normal after the first month and the cough disappeared in the third month. She gained twelve pounds since she stopped the treatments, and is to-day apparently well and healthy.

CASE XIV.—Miss T. R.; Mexican young lady, age 26; family history negative. Came to consult us on March 25th, 1901, for cough, pain in the chest, afternoon rise of temperature, etc. Has been sick about two months, having lost some ten pounds during this time. The microscope revealed a few tubercle bacilli in the sputum and she was at one placed on creosote internally and the application of the X-rays. She was treated for three months, having received twenty-five applications of the X-rays, and improved slowly at first, but on the third month the temperature became normal, the cough disappeared and she gained five pounds. She is to-day apparently well and has regained her ten pounds. Two guinea pigs that were injected with her sputum three months ago are alive and well.

The report of these fourteen cases shows that there has been three deaths in two years and the remaining eleven are still living. Although two years is hardly time enough to predict any definite results, still the following conclusions can be drawn:

1. X-ray treatment prolongs the life of the Mexicans afflicted with incipient tuberculosis.
2. Only incipient cases appear to be benefited by the X-rays.

3. Former experience has demonstrated to us that this class of cases never get well, and in fact succumb quicker to the ravages of the disease than the eastern people who come here for lung trouble. The majority of the Mexicans die within one year of their first infection.

4. X-rays in this climate have apparently cured eleven out of fourteen cases of tuberculosis.



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# American Electro-Therapeutic and X-Ray Era

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## Original Contributions

### SKIAGRAPHY AS AN ART.\*

By J. Rudis-Jicinsky, A. M., M. D., M. E., Cedar Rapids, Ia.

Skiagraphy is to-day the greatest help to diagnosis in medicine and surgery, and a science and art in itself. It is indispensable in military surgery and in diagnosis of certain lesions, viz: fractures, dislocations, diseases of bones, foreign objects in the human body, diseases of the joints, lungs and other organs and valuable in the study of normal and comparative anatomy; in different pathological conditions in dentistry and in medico-legal cases the best consultant and the best means for arbitration. It is the greatest educator that we now have in anatomy, for without skiagraphy we would know but little about the great wonders that exist in the ossification and development of the bones, changes in joints, the deposits of the earthy salts at the epiphyses, the real truth about our physiological dicta in regard to the lungs, the heart and the diaphragm. When we see a skiagraph of some old luxation, some deformity, intra-thoracic growths, aneurism, or the first traces of haziness, showing tubercular infiltration or isolated foci of infection in the lungs we are shown studies that give us a vivid idea of the necessary steps to be taken to relieve suffering or prolong life.

The photography of the invisible has become the best method of obtaining a correct and true representation of many

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\*Read before the "American Roentgen Ray Society," Chicago, Ill., Dec. 10th and 11th, 1902.

things that have been obscure in the lesions of the living body, and to-day it enables us to produce pictures that surpass any painting ever placed on canvas with a brush, giving us not only the shadow but the substance also, the internal structure with beautiful depth and perspective. Constant study and research along scientific lines has elevated the new branch of our profession—thanks to the discovery of Professor Roentgen—and placed it second to none.

There are many who are having a hard time making a success in skiagraphy. Why? Because they start without the proper knowledge in physics, chemistry, anatomy, physiology, pathology and the *knowledge of illuminating and posing*. To light and pose the subject exposed properly, is the most vital part of the art.

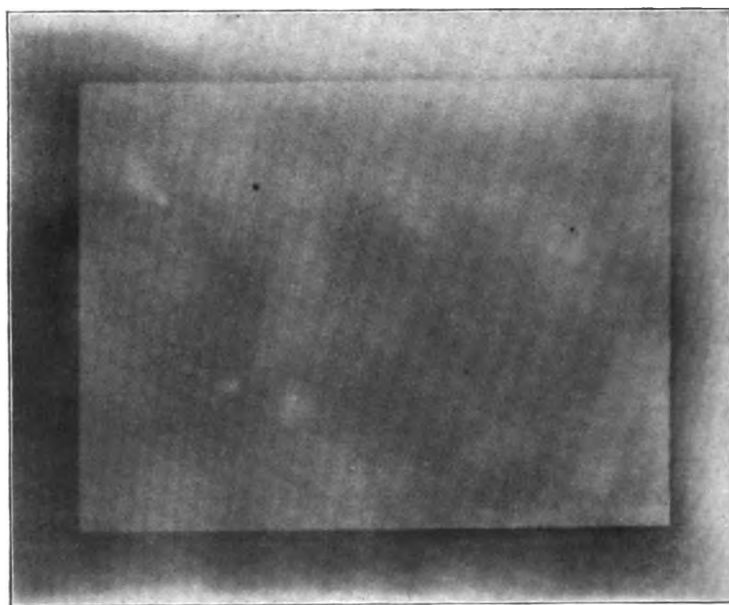


FIG. 1.

Plate overilluminated. Patient with dilated stomach, swallowed purposely and for this experiment specially, a metallic plate with three false teeth attached. Stomach and intestines emptied before the experiment thoroughly. The small plate was in a rubber bag connected with a stomach tube. The intensifying screen used. We may see the movements of the stomach and intestines by their shadows, especially those nearer to the photographic plate. The false teeth do not show plainly in print on account of the over illumination.

It is well known that more difficulties are met with in skiagraphing thick bodies than thin ones. A principal reason for this is found in that the X-rays undergo strongly diffused reflection on traversing all substances, the consequence being that at the corners or edges of a dense substance the rays appear diffused. This diffused reflection of light is particularly strong in the soft tissues of a person under operation. From every minute part of the soft tissue exposed, rays are independently, directed upon the plate, and this is the reason the skiagraphs of the gluteal region appear with so little contrast. To obviate this evil, care must be taken not to illuminate a greater part of the body than appears absolutely necessary, "concentrating"—so to say—the rays at the point desired. If we use the intensifying screens, though, we have to be careful not to over-illuminate the parts exposed. This is shown in figure 1, where the small and broken plate with three false teeth swallowed and lodged in the stomach of a patient does not show at all, giving a slight shadow. This might be expected, as in the well-known Cleveland case ("Cleveland Medical Journal," December, 1902). On the contrary, with a tube of proper vacuum and proper exposure with the diffused X-rays shut out, shows on the other negative and verified positive, plainly with the round opening in the lead plate division of the same, the intensifying screen and the stomach. The irregular haziness of the plate is due to the movements of the stomach during the exposure. (See plate 2.)

We get such pictures and obtain clear representations by instantaneous exposures only, either with powerful coils having the capacity of giving 30-40 inches of spark, and tubes for cooling the anode by cold water, or with a static machine with at least ten up to twenty-four plates, with a set of interrupters on, called multiple, an improved German tube, extra large size, a lead box, or so-called "Protector," a combination of a screen and a shield with different openings and diaphragms, designed by the author, to exclude the diffused rays, and with the intensifying screens. (The "Protector" protects the patient and the operator against "so-called burns," and in radiotherapy may be used with different specula for internal treatment with any focus tube.) The exposures must not be prolonged—seconds instead of minutes—and if we use a lead

plate in addition as a support of our X-ray plate, as described in "New York Medical Journal," March 22, 1902, we will get a great deal of information in regard to the soft tissue especially, not obtainable the usual way. The disk of platinum in the tube has to be red-hot and at its best, counting the exposure in seconds from this moment only. If we reduce the images for stereoscopic work the details are lost, but if we enlarge our negatives proportionately we may get wonderful positives with all the detail otherwise lost in print.

How many skiagraphs one sees that are lighted in such a manner as to destroy the most natural of the features of the subject. They are over or underexposed, the details sought being lost altogether. Do not put your subject so as to get the most beautiful picture, but try to get the real *status praesens* and the details of each individual case depicted in

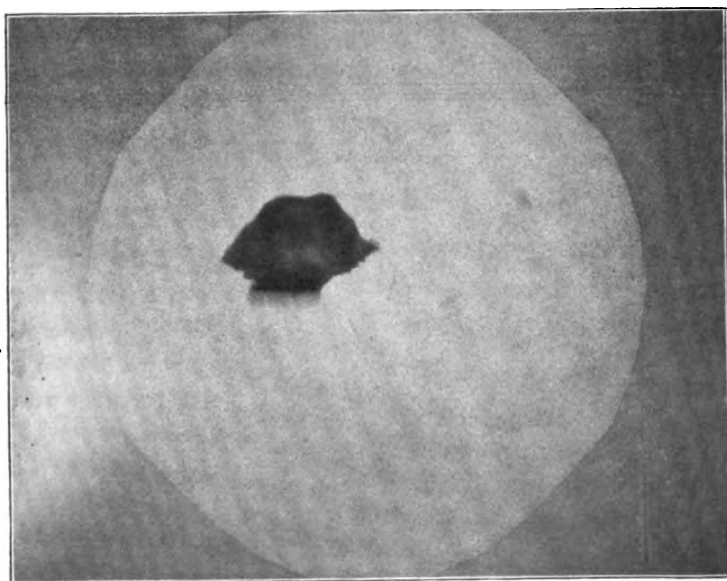


FIG. 2.

With a proper tube and proper illumination the teeth show plainly in the stomach. The best rays concentrated, so to say, at certain point through an opening in a lead plate, which shows with all the lines for localization. Intensifying screen used, as seen on the photo. The negatives are larger, and show the body and moer details. In this case the patient was a big New Foundland dog.

every shadow of the picture. If you can do this, verify your picture and at the same time know how to read the shadows given in the ratio of their density, you have then accomplished a great deal and will be sufficiently repaid for your extra effort to obtain most artistic results along with a perfect diagnosis in cases supposedly uncomplicated, but which have injuries more extensive than anticipated, or of quite a different character from what one would expect to find, judging from the history, symptoms, physical signs or findings of the dreadful probe.

Many practitioners still speak of skiagraphy as an easy mechanical process, that little is to be gained from the X-ray examinations, which ultimately result in the complete loss of the surgeon's sense of touch, and what not. They say that the operator's work is very simple and the revelation of the true conditions in medico-legal cases more dangerous than useful. That is a wrong view of this marvelous, but most accurate art. Little do these men know of the skill, judgment and experience required to make the most satisfactory work of to-day. Any operator of artistic ability will tell you that observing men usually profit by their mistakes, and honest men seek always the truth and truth only, paying most careful attention to details in diagnosis and interpretation of a picture of this kind. Sometimes skiagraphs which seem unsatisfactory to the majority of ordinary observers are readily explained by the expert, who has to be in possession of all the accessory facts and factors, remembering that he has received a true link for our diagnosis, which to strengthen the chain requires the thorough application of other confirmatory methods, if necessary. If you fail the remedy lies in taking one's self a little more seriously. Learn the capacities of your apparatus, know the individualities of your tube, your plate, developer, paper and your chemicals. The smallest apparatus of good make, if used with due regard to its capabilities, should produce no more failures than the most expensive one on the market. Of course the possibilities are not so great, but so long as you have control of the switch, failures are blamable upon yourself alone. Your apparatus is innocent. Learn the fundamental rules. When you fail you have violated one of them and you should ask yourself what it is



that has been wrongly done. Your apparatus is all right. You have either asked too much of it or neglected your own share of the work. We have to remember that the action of the Roentgen rays on the tissues of the human body, just as well as on the film of our plate, is of marked electro-chemical character, and that the particles in a Crookes' tube and also those occluded in the terminals become electrically charged and carry their charge from one terminal to the other when the tube is in action. The stream goes from the cathode to the anode. This movement of particles results because they are repelled from the cathode and attracted to the anode and strike the latter with greater force. The greater the quality of charge imparted to the particle the greater will be its repulsion and the force of the bombardment. This breaking up of the particles produces the X-ray. Therefore the more particles we have in action the greater will be the quantity and quality of rays, which we have to observe constantly to get proper illumination of parts exposed, the subject being as near as possible to our plate and in a good position.

In plate 3, and still better in the negative of that case, we may see that the proper application of the X-ray is not only determining that the lungs and the heart were affected with disease, with calcareous deposits here and there—when there was no other possibility of diagnosis, but it located the area over which the disease extends in soft tissues, giving us the correct diagnosis in regard to the trauma and repair in the bones. The negative and partly the positive is full of delicate, ghost-like, yet clearly-defined outlines of skin, muscle, tendon, connective tissue bands of repair, new socket at the shoulder joint, and the marrow cavity of the bones; the heart shows beautifully, the auricles being dark with still darker spots of calcareous deposits at the valves; the liver is plain in outline and mapped out in relation to the usual landmarks. The stomach being not distended artificially, but being full of gases perhaps, gives the record of its location and size—the first ever seen poised among its natural surroundings without special preparation. Made in 1898. The density of the different shadows is worthy of study and gives us the opportunity to find out what a proper illumination of a subject and a correct position really means. The diagnosis made in

this case with the X-ray only, was later verified by the post-mortem examination; patient died suddenly with "heart disease."

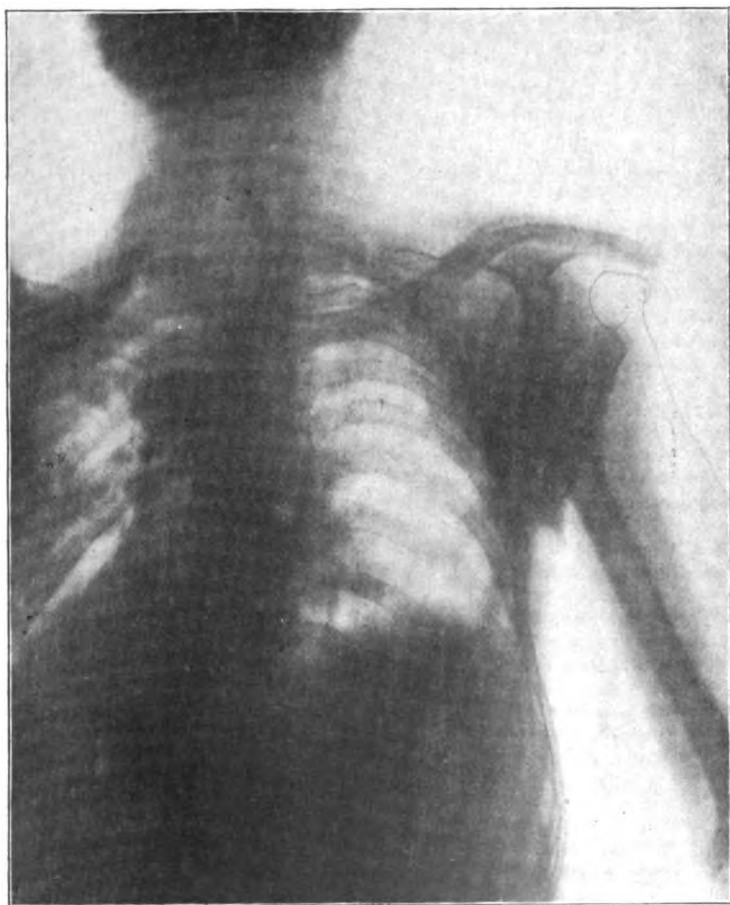


FIG. 3.

Reduction tried under anaesthesia, but the patient collapsed twice. Later on post-mortem made and the diagnosis made by the X-ray verified. Case reported in full to the Western Surgical and Gynecological Association, Chicago, Dec. 10, 1901.

And here is another picture of another case (plate 4), important especially from the medico-legal standpoint. The case found its way into court and the attending surgeons are sued for damages to the amount of \$10,000, as said in the complaint: "For the unskillful, improper, negligent and careless setting and putting in cast of plaintiff's right leg, which was fractured at the junction of the upper and middle third, December, 1901." In this case all proper care was given to the patient, the leg dressed properly with extension box and weights on, and later put in plaster of Paris. There is shortening about one-half of an inch only. The result is comparatively very good. But here is the suit! Now, if we study the shadows of the skiagraph of this case we will find that there is a partial dis-



FIG. 4.

**Medico-Legal case.** Fracture at the juncture of the upper and middle third of the Femur. Properly dressed, but refractured by the patient. The white spot showing the secondary calus plainly and the effect of the Nature to repair.

placement of the fragments, or refracture of "green-stick" variety, which most assuredly took place after the formation of the first callus, the secondary callus showing the effort of nature to bridge over, being a light shadowy white spot, in ratio to the time and density of the callus. We would particularly call attention in this regard to the character of the shadow of the secondary callus in comparison with the first one. This is a good evidence, verified by a fluorometric picture, and the positive evidence that the patient walking already on crutches, when home from the hospital, slipped on a rug and fell left leg under and right across and in front of the body, gives the rest of the story. The patient bent his leg, produced the partial displacement of fragments, which were in apposition, fractured the first and forming callus, and now blames the surgeons! Such a picture, showing the real condition, is very convincing when we are in possession of all the accessory facts and factors, and would be sure to have great weight with the jury which, in view of the circumstances, we hope earnestly will and has to exonerate the surgeons.

The correct reading of the shadows of our pictures, as shown, is not always an easy task, and every skiagrapher with proper aspirations should place a high standard in this regard before him and then make exertion to reach it. It is better to aim high and only to be content with the highest and best. Every one of us will judge for himself whether he is to be content himself with mere routine, or aspire to artistic and scientific productions. The times call for work of high order, and further research and further experimentation, judgment, study and careful execution will attract the patronage of the intelligent physician and surgeon, who needs our help, as experts in this new branch of diagnosis and treatment, and the general public will appreciate the difference as to who makes the picture, paying gladly a good price for your superior skill. acquired from constant study and long practice.



## GALVANISM IN PELVIC DISEASES OF WOMEN.\*

By C. S. Neiswanger, M. D.

The introduction of the X-ray into the domain of medicine has been productive of much good, both because of its therapeutic and diagnostic value, and that it has been the means of inducing many physicians, hitherto antagonistic to electro-therapeutics, to give a more careful study to the subject. But the X-ray has its limits in therapeutics and no amount of enthusiasm on the part of its advocates can carry it beyond those limits without hurting it and themselves. All therapeutic agents have done more harm than good by being misused, and so must this remedy find its level and be used only for that which it will accomplish.

Although this ray which appears beyond the violet end of the spectrum does not affect the retina, it seems nevertheless to have completely *blinded* us to the fact that we have other electrical manifestations that are not behind it in therapeutic value.

The physician who understands and uses much galvanism soon accumulates a gynecological practice. The reason for this lies in the fact that a majority of the pelvic diseases of women are ushered in by vaso-motor nervous disturbances and galvanism does most efficient work by its action on the vaso-motor nerves.

The function of menstruation is distinctly a vaso-motor phenomenon and, with galvanism, we may do with it what we will. We may increase it or we may stop it. [?E.D.]

Take, for instance, menorrhagia and metrorrhagia, in both of which the walls of the pelvic blood vessels from vaso-motor nervous disturbance have become relaxed and patulous; they will not contract and expel their engorged contents and the patient bleeds for from six to ten days, becomes almost exsanguinated and takes the other two-thirds of the month to recuperate, only to have the process repeated, and soon becomes an invalid. In this condition we must use the positive pole of the galvanic current in the vagina, well up in the Cul-de-sac of Douglas. This pole, by its action on the vaso-motor nerves, contracts the blood vessels, gives a better tone

\*Paper read at the meeting of the Chicago Electro-Medical Society, February 24, 1903.

to their muscular walls, and, by its decidedly sedative action, lessens the pain. By giving three treatments per week for the three weeks preceding the menstrual flow we have an improvement of at least 50 per cent in the next period.

Now take the opposite condition, amenorrhea, where we have an anemic condition of the pelvic viscera. The blood vessels of the pelvis, again from vaso-motor disturbances, are contracted and the blood supply decreased. By the use of the negative pole, which is a powerful vaso-dilator, we can speedily ameliorate the existing conditions. [If you exclude chlorosis, pernicious anemia, leukemia, Hodgkin's disease, tuberculosis, chronic interstitial nephritis, in which nature is conservative and saves the blood for reparative purposes.—ED.]

We may divide the pelvic disorders roughly into three classes—first, menstrual disturbances; second, post-infective diseases; third, trophic disorders.

I have already mentioned what galvanism will do in some of these menstrual disturbances. The treatment requires time and patience. Young girls often need this treatment, because of indoor life in school and home. They are chlorotic, have dysmenorrhea—generally amenorrhea—and soon become nervous wrecks and invalids.

In such cases direct treatment through the vagina is not often allowed, but the galvanic current may be applied from the outside. A small sponge electrode is placed over the pubes and a large one in the dorsum. The electric current is always concentrated on the small electrode and the organs immediately beneath it will receive proper stimulus. If the case be one of amenorrhea the smaller electrode over the uterus is attached to the negative pole.

We will now discuss the second class of diseases, and these are in most cases due to infection of the gonococci. They are apparent in a majority of married women who come for treatment. The clinical symptoms are generally quite distinct; pain in the left side, excessive menstrual disturbance, profuse uterine discharge, etc.

These cases have always called for operation, but it is remarkable how much relief of the severe symptoms hot water alone will effect if applied persistently. I have four cases

which were very severe, one of which I shall report in detail.

Mrs. R. came to my clinic at Post Graduate School. I examined her and diagnosed a pus tube. Two other members of the faculty of the school confirmed the diagnosis. Operation was advised but positively refused. Because of this refusal I was free to give her electrical treatment. In this connection let me say that I have no words but those of commendation for the skillful operative treatment which is uniformly given to such cases, and it was only after the operation had been refused by the patient that I consented to use electricity. At the commencement of the treatments there was a profuse virulent discharge from the uterus. There was constant pain, the left tube was so low that it could be distinctly palpated. The os was much eroded by the discharge.

I used copper electrolysis, applying the positive pole in the vagina and the negative to the abdomen. After four or five treatments the discharge was thinner and slightly greenish in color. This discharge came from the uterus and not from the vagina, as I was very careful to prove this fact. The color of the pus showed that there had been a thorough deposit of copper salts in the tube, and not limited to the vagina, as might be expected at first thought. I made cultures of the discharge and found it sterile. The oxy-chloride of copper, being a powerful antiseptic agent, had destroyed the pyogenic bacteria. After eight more treatments the discharge ceased entirely. I was at first inclined to regard this as a bad symptom, reasoning that I had dammed up the tube and expecting that there would be a rupture into the peritoneal cavity, but no such accident occurred. The temperature remained normal and I soon saw that there was no evidence of pus. I gave the patient sixteen or seventeen treatments, during the last few of which there was no evidence of any diseased condition in either of the tubes or the uterus. This was nearly four years ago and the patient is well to-day. The other three cases presented a similar history and behaved equally well under treatment. At present I am treating another case where operation has been advised. This is my fifth similar case. There is a pus tube; the uterus is much inflamed; the os is eroded by the acrid secretions. This case is reacting as

favorably to the treatment as the others, but it is not far enough advanced to warrant positive statements.

It is now my practice to amalgamate the copper electrode with mercury, because the mercury salts are perhaps more powerful antiseptics than the copper salts. The mercury is a little more irritating, however, to mucous surfaces, and very frequently the vagina becomes sore.

Massey, however, says this acts as a counter-irritant and is therefore of value.

The treatment has to be given with some caution, however, because the positive pole is a powerful constrictor of the walls of the blood vessels, and menstruation may be suspended if the applications are pushed just prior to that period.

I have had several cases where the menses was entirely stopped by the use of the positive pole, though the patients had been perfectly regular before.

Cases of ovarian neuralgia react favorably to galvanism. The treatments are given two or three times per week through the vagina. In cases of endometritis, the copper electrode in the uterus is almost a specific. I use about thirty-five milliamperes of current. One difficulty met is the sticking of the electrode. It was formerly recommended that the poles should be reversed when the electrode was to be withdrawn. But this is not a good procedure, because much of the good accomplished by the treatment is neutralized by the copper being re-deposited upon the electrode. The electrode will not stick if kept continually in motion, and it should be rather moved laterally or in a circular manner, because the uterine canal is more triangular than cylindrical, and by rotating the electrode laterally it has just curve enough to reach the horns.

When the os is not much contracted I am accustomed to use a hard rubber tube closed at the distal end, that has holes drilled in it for about two and one-half inches. In this tube is placed an applicator composed of a copper wire twisted upon itself, upon which is twisted wet absorbent cotton. In this manner the metal does not come in contact with the mucous surface, and consequently the electrode does not stick. Another familiar picture to the gynecologist is that albuminous plug protruding from the os, which means a cervical



catarrh. Where this plug is thick, sterility and dysmenorrhea result.

The usual method of treatment is by curettment, but this is an operation and should be done under anesthesia.

Such a condition is very easily relieved with electricity. We place a copper electrode in the cervix, making it the positive pole and turning on thirty-five to forty milliamperes. The electrode in about ten minutes will be stuck fast. Traction is used and the electrode brought away. With it will come the albuminous plug; the current has coagulated it. We have, in fact, done an electrical curettment. But we have done more. We have deposited the oxy-chloride of copper throughout the diseased area and its antiseptic action will be sure to destroy the bacteria which keep up the diseased conditions.

We shall now turn our attention to the trophic disorders which comprise cases of undeveloped uterus, versions, prolapsus and retro-versions. The infantile uterus is very frequently met with, and is one of the principal causes of dysmenorrhea and sterility. There is a pin-hole os and the uterus is about an inch in depth. In the treatment we use the same electrode as is used in stricture of the male urethra. The olive point is placed inside the os and a current of six or seven milliamperes is turned on, the electrode being attached to the negative pole. Very soon the electrode will pass into the uterus and a certain amount of tissue has been decomposed. We must now turn off the galvanic current and use a Faradic with slow interruption to induce muscular massage and stimulate the tissues so that the decomposed products may be eliminated. It is my practice to use the ribbon interruptor, which of itself would give too rapid an interruption and would merely tetonize the muscles. We divide this into periods of from 60 to 100 per minute by means of the rheotome. This is quite the ideal method, because it produces strong contractions of the muscles alternately with complete relaxation.

In cases of retro-versions of the uterus we have to deal with adhesions which are sometimes produced by the rubbing of the uterus against the rectum. These adhesions may be broken up by using a vaginal electrode connected to the

negative pole. This must be followed by Faradic massage as explained above, to stimulate the lymph channels.

I regard Alexanders' operation as most irrational in many cases, for too often the round ligament has so degenerated that there is left very little muscular fiber. This operation calls for a shortening of the round ligament in the expectation that the uterus would then be properly held in place. In too many cases it fails entirely and increased adhesions result. The electrical treatment is to develop the muscular fiber of the round ligament by proper Faradic stimulation. I make it a point to never treat a uterus out of its normal position. Frequently it is necessary to insert the electrode at right angles to the normal position of the uterus, but during the treatment I always turn the electrode, and with it the organ, to the normal position. In one case there was almost complete prolapsus of the uterus and the patient felt more comfortable when the uterus was down, but after a few weeks of treatment it staid in its normal position and the patient has been fairly well ever since.

#### DISCUSSION.

To a question from Dr. Grubbe regarding the technique of the treatments of salpingitis, the reply was that the treatments were given tri-weekly for ten minutes. It is a good thing to use Gautier's rule, twenty-five to forty miliamperes for ten minutes. I use a large cotton pad covered with cheese-cloth, into which is stitched spirally a copper wire, to which would be attached the wire from the battery. This electrode should be thoroughly wet. It would then be easy to get any desired milliamperage, since its surface was so large. Dr. Burdick said he had used at one time as an abdominal electrode a shallow pan covered with animal membrane, invented by Dr. Martin.

One of the objections to this form of electrode is that it will sometimes burst, letting loose a considerable quantity of water on the body of the patient.

Dr. Neiswanger said that he had often left the water in these electrodes without very much leakage and he had noticed that after the current had been passed through them several times there would be no odor, even though kept moist.

Dr. Burdick said that he had not found this the case.

Dr. Grubbe said he had used an abdominal electrode which was free from the objection of lack of cleanliness. He had a large towel wrung out in water and thoroughly saturated. He placed this upon the abdomen and sides and upon it a flat sheet of lead, to which was attached the appropriate wire from the battery.

Dr. Neiswanger said that very frequently the current would be so concentrated at a point where the battery wire was connected with this electrode that a small blister would be produced on the skin immediately beneath it.

Dr. Grubbe replied that he had no such difficulty when the electrode was properly constructed and the towel saturated. He had found that eighty or ninety milliamperes could be used on certain cases, while others would not endure more than five or six milliamperes. He limited the dosage to the tolerance of the patient.

Dr. Neiswanger replied that he had found the tolerance in the same case would vary according to the disease. He had found that where pain was decreased by pressure, Faradism would relieve this, but where the pain was increased by pressure Faradism would only make it worse. He used a modified rule of Apostolli for diagnostic purposes, viz.: If the moderate use of galvanism causes pain and that pain is relieved by the high tension Faradic current, there is no pus present, but if the application of galvanism causes pain that is not relieved by the high tension Faradic, you will always find pus when you operate.

Dr. Grubbe then described an interesting case where extensive adhesions had been produced by operative procedure. So far as he had been able to learn, the original operations, three in number, were hardly justified, but three laparotomies had been performed. One ovary was removed. At the next operation the other ovary, the third operation the uterus. All the symptoms were much aggravated after the operations. He had used galvanism locally, using the negative electrode. The case had improved very much in only three weeks. He was surprised to note, however, an exceptional idiosyncrasy, for the patient would endure only the smallest currents. He was sure that this was not due to hysteria from the physical

condition of the patient, and also from fortitude she had exhibited in her operations. So far as he was able to learn the original condition was simply a cold which had developed into dysmenorrhea. Another case was that of a married woman suffering from acute gonorrhea. There was no doubt of the diagnosis both from the symptoms and from the character of the discharge. He had treated the case by cataphoresis and after five applications of the copper electrolysis every vestige of the discharge had ceased. The treatment was somewhat severe, but he felt vigorous measures were necessary.

The orifice to the bladder was small. It was thoroughly dilated and the positive electrode was brought into immediate contact with all parts of the mucous membrane. The vaginal wall was thoroughly treated with the large copper electrode. It took about forty minutes to treat the patient and he never saw better results.

He had a case of infantile uterus which he had treated by the same method recommended by Dr. Neiswanger.

Dr. Boomer said he had used electricity up to the last two years, but had not used it in diseases of women. He had followed the general opinion expressed in the literature on the subject that electricity might lead to unfortunate complications. He had used the copper electrode in treating cases of gleet in the male urethra. He felt that the paper had made out a very good case for the agent and he would be more inclined to try its effect.

Dr. Burdick said that when he first graduated from college he devoted considerable time to gynecological cases and had been quite successful in a number of them. He got good results in the treatment of salpingitis. He had used mercury on brass for cataphoric treatments and found the effects very beneficial in the disease just mentioned. It was about this time that the operative fever struck the country and no one of reputation could be found to recommend electrical treatments. He had had a considerable experience both as an assistant surgeon and as an operator in many gynecological cases. Some of these cases though benefited by the operation were not wholly relieved, and they had kept coming for treatment at irregular intervals for a number of years. Of late he had

again begun the use of electricity and was surprised to find how favorably the cases reacted to the treatment. He did not agree with Massey that it was wise to use large currents because frequently sloughing ulcers in mucous membranes would be produced which would be very difficult to heal.

He was now able to get copper electrolysis without using a heavy galvanic current. It can be done by the alternating current, a sine wave current of very slow interruptions, two to four per minute, that carries the copper into the tissues on both sides of each electrode and does not produce the cautery effects of the gases liberated, the effect of each gas neutralizing that of the other.

We can use three or four times as much current that could be tolerated for galvanism, because the current is not painful but is rather pleasant. An ideal massage is secured, for the current gradually swells from zero to a maximum strength of toleration and then sinks to zero with no break or jar.

We reverse the poles before the sine wave is again started.

The treatment bids fair to be of the greatest value. Since we get muscular as well as general atomic stimulation. The diseased tissue is broken down and eliminated. The temperature sometimes rises to 100 or even 103. The urea is increased to 5 1-2 per cent, and in one case 6 per cent, an achievement impossible by galvanism.

An apparatus has already been constructed and will soon be shown to the society complete, now needing only a few minor changes to improve the appearance and change it from an experimental instrument to one fitted for general use. The use of cataphoresis is only in its infancy. We have tried only the commoner elements and we have found that they are of considerable value. But some of the rare metals should now be tried.

Dr. Burdick took exception to the statement of Dr. Neiswanger regarding the *modus operandi* of cataphoresis. He believes that the ion itself goes into the tissues; that is, the metallic ion is torn from the metal electrode and carried by the current into the tissues. He believes that nearly as much copper may be deposited by the alternating current as by the direct current, and in some cases may be even more, because a greater current may be tolerated. When copper electrodes

are dipped into salt solutions they are decomposed about one and a half times as fast by the alternating as by the direct current.

A statement made by Dr. Neiswanger may be very easily misunderstood. Some cases of prolapsus of the uterus might not be benefited very much by electrical treatment; for example, where both posterior and anterior walls of the vagina are destroyed by child-birth, both the bladder and uterus might prolapse. Such cases need surgical attention. In other cases where the prolapsus is due simply to chronic constipation, electrical treatments might be of great value, but they could not correct a true procedentia from lack of support of the pelvic floor.

In place of the copper and zinc, we now propose to use other metals not alkaline. For instance, calcium. He had tried this on two cases, one case had had several laparotomies, a hysterectomy and a double ovariectomy. She was a nervous wreck. Had some stomach trouble and her bowels were inactive. After a treatment of two weeks with the alternating sine wave current there was an immediate improvement, pain relieved and the soreness left, and bowels will now move and the case is already much improved. The prognosis seems quite hopeful. Another case on which he had operated four times, finding a large pelvic abscess each time. The patient is now suffering from abdominal neuritis and at times is almost frantic. He gave the same treatment and the patient now thinks that she is well and he has great difficulty to keep her faithful to her appointments. He was using the sine wave treatment, one electrode in the vagina, the other at the nape of the neck, using twenty milliamperes of current. She had had but nine sittings.

Dr. Neiswanger, in closing, said that he did not mean to state that the *oxy-chloride* of copper was carried into the tissues. The copper tends to go to the negative pole and the oxygen to the positive pole. The free oxygen united with the copper in the tissue and afterwards the oxy-chloride of copper is formed from the chlorine that comes from the free hydrochloric acid in the tissues.

He agreed with Dr. Burdick that wherever the pelvic floor was broken down, surgical procedures are necessary. This

holds true in cases of procedentia, but it was not rational to break up adhesions in the pelvis either by incisions through the abdominal wall or through the vagina. He believes in covering the electrode when positive, though Massey objects to this procedure. Dr. Neiswanger holds that the metal will pass into the tissue as readily through the cover.

Another very important condition which he had not mentioned in his paper was the treatment of extra-uterine pregnancy. It is remarkable that many of these cases take care of themselves, without rupturing into the abdominal cavity. In the treatment of such cases it is of vital importance to make an early diagnosis. This is far from easy by the ordinary methods.

Frequently a digital examination per vagina will reveal a mass in the pelvis. This may be a hematocoele, a small fibroid or an extra-uterine pregnancy. If the latter, then it will be acknowledged that the first thing necessary is to destroy the life of the fetus. This is accomplished not so much by any *polar* effect of galvanism as by shock. Any interrupted current will do. Give treatments daily for from five to ten minutes. This could do no harm nor good in any other condition; if any diminution of the mass occurs, we can make the diagnosis of extra-uterine pregnancy and be sure that the fetus is dead. We can then use the negative pole of the galvanic current per vagina to hasten disintegration and elimination of the dead tissue. He had known a fetus of three months to be thus absorbed without any necessity of surgical interference.

!![While agreeing with much of the paper, I must take exception to the statement that adhesions of the uterus can be broken up by using a vaginal electrode connected to the negative pole. This cannot be done unless the electrode is put in direct connection with the adhesions and could not be done through the walls of the vagina or uterus. —Ed.]



### VARIOUS SURGICAL OPERATIONS.

By Dr. Cramer, St. Joseph's Hospital, Weisbaden, Germany.

That the X-Ray in modern surgery and anatomy has become an indispensable *vade mecum* needs no more comment. The surgeon who does not avail himself of the vast advantages and facilities of the electro-mechanical appliances for diagnosis or treatment is not up-to-date. Many instances and cases which present themselves almost daily, such as traumatic injuries, tumors, etc., need no longer vex the practitioner in determining such anomalous affections. It is scarcely to be remarked that the essential requisites are a reliable static machine or coil and an approved tube (one that is reciprocal for rendering it hard or soft), together with the radio-photographic appliances.

The writer mentions two severe bone tumors of singular characteristic positions as found near the upper extremity of the tibia and the head of the humerus—well formed tumors and exostoses, whose seat was close to the cartilage of the joint, which latter appears to be most prone to exostosis—whose origin, one might think, was brought about through some trauma or other cause. He finally exhibited a foreign body in the brain, which latter showed most remarkable symptoms. A like body was shown in the neck and one in the forearm.

The radiographs were obtained by the usual means—coil and quicksilver interrupter, requiring, according to the thickness of the objects, from one-half to ten minutes' exposure.

#### ENCHONDROMA OF THE HEAD OF THE HUMERUS.

Mrs. H., age 31, fell on the doorstep ten years ago, her left shoulder coming in contact with the casing of the door-post. The accident required her to remain in bed for four weeks, her left side being affected. After some massaging of the body, temporary relief was manifest. In the fall of the same year rheumatic pains began in the region of the shoulder, which rapidly increased in severity. The application of camphor splints gave some relief to the pains, but these were never wholly dispelled, and usually the affection recurred most severely on the approach of the cold season. In the spring season of 1899 she discovered that the left arm became much thinner after the pains in the winter season had been excessively troublesome. Again she sought the physician.



Massage, Faradism, rubbing with ointments, etc., gave no relief. An examination by the X-Ray was now made, which at once showed that the head of the humerus was largely softened. A resection of that part was at once undertaken, which, after being divided with the saw, showed quite a large circumscribed quantity of clear gray, soft, cartilaginous web, which, being microscopically examined, proved to be a net of cartilage. In this case it was of special interest that at the lateral end of the tumor, where the greater tubercle rises, an old fracture was found, which was undoubtedly caused by her fall ten years ago. There can be no doubt but that the trauma was really the cause of the deterioration of the bone. All these conditions are clearly shown—how the tumor increased in size, the various conditions of softening; the fracture is exhibited in the radiographs from the extirpated bisected bone.

#### A SARCOMA OF THE TIBIA.

Mrs. B., age 25 years, for two years past experienced lightning-like piercing pains in the knee, yet, during several months, complained of no such affections. One year thereafter the pains became so severe that she could not walk any more. Again she convalesced; then the pains recurred so that she had to go to bed. The diagnosis of a sarcoma of the tibia could readily be made, even without the X-Ray. When, however, a radiograph was taken and the diagnosis verified, the upper joint was extirpated. The skiagram exhibited very distinctly the muscles and tendons, while the tibia appeared quite soft, due to the growth. The microscopic examination showed a small round-celled sarcoma.

#### A REVOLVER BULLET IN THE BRAIN.

Miss D. sustained, through carelessness, a revolver bullet in the head. Its entrance was some 2 cm. below and outward of the left eye. Soon thereafter partial paresis appeared upon the left side. In addition, her mind was somewhat affected. She was willing to undergo any operation, but this procedure was not deemed practical, after two X-Ray radiographs had been secured. Two dark fragments were seen on the local periphery of the eye. In this it manifestly dealt with metallic remains which the penetrating shot left upon the bone. The

large but less sharp shadow of the bullet was observed in the hindmost part of the cranium. It was determined that the shot had lodged in the right side of the cranium; a subsequent radiograph verified the assumption. It followed that the nervous disturbances in the opposite side were to be anticipated.

A REVOLVER-SHOT IN THE NECK.

Mrs. C.; husband had attempted a murderous attack. The back view of the X-Ray picture showed a bullet firmly imbedded in the sixth cervical vertebra somewhat to the right side of the spinous process. It was found, in the taking of the radiograph, that the projectile was located quite near to the plate, and its position could not have penetrated very deep. Upon administering a chloroform narcotic, a small incision was made and the bullet extracted.

Mrs. A. had suffered, for many years, painful attacks of melancholia and hysteria. These anomalies, usually caused through anger, induced her to introduce pins under the skin of the left forearm. She had thus fixed quite a respectable quantity. The majority of them healed up within a week, and left no reactions. One, however, caused severe pain, so that she consulted a surgeon, who radiographed the position of the pin and extirpated same.

Reported from: Fortschritte auf dem Gebiete der Roentgen Strahlen.



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## Editorial.

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### MINUTES OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

Meeting called to order.

Dr. Burdick in the chair.

Reading of the minutes of the last meeting.

Action in regard to the resignation of the Treasurer was moved to be stricken from the minutes and referred to the Board of Trustees for action.

Minutes were then approved.

The following names were reported as elected to membership by the Board of Trustees:

A. A. O'Neill, M. D., 4607 Champlain avenue, Chicago.

N. C. Flint, M. D., 749 Marshall Field Annex, Chicago.

Paul C. Boomer, M. D., 3121 Indiana avenue, Chicago.

The following were elected to associate membership:

W. C. Fuchs, Horatio H. Harwood, A. B. Slater, John McIntosh, C. O. Schneider, Roy C. Ryan.

Bill for the rent of the room was ordered paid.

The Society then listened to a paper by Dr. C. S. Neiswanger, on "Galvanism in Pelvic Diseases of Women."

The paper was discussed by Drs. Grubbe, Boomer, Brubaker and Burdick.

Society then adjourned.

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### NOTICE.

The next meeting of the Chicago Electro-Medical Society will take place Tuesday, March 31, 1903, 8 o'clock p. m., at 301 Schiller building. A paper will be read by Dr. R. A. Street, entitled "The X-Ray, its use and abuse." Symposium on Photo-Therapy. A new lamp used for this class of work will be exhibited by Mr. John McIntosh. The attendance of every member is desired.

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## Abstracts and Reprints.

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### ACNE TREATED WITH THE X-RAY.

(Abstract of a paper by R. R. Campbell, M. D., of Chicago, in the *Journal of the American Medical Association*.)

The treatment with the X-rays was suggested by its power to check pus formation and the atrophy it produces follicles. He reports fourteen cases, a number of which we give in full:

CASE 1.—Miss E. R., aged 20, had been under constitutional and local treatment for three months, without any appreciable improvement in the local condition. Early in January, 1902, the X-ray exposures were begun. She was given three exposures weekly of ten minutes each, with the tube 15 or 20 cm. distant. After two weeks there was manifest improvement and the exposures were reduced to two sittings weekly; by the end of February no active lesions or comedones could be detected, and the exposures were further reduced to once weekly until the end of March when all treatment was discontinued, and from that time to the present writing no relapse has taken place. No dermatitis or erythema was produced in this case at any time.

CASE 2.—Mrs. S. A., aged 33, brunette, after other treatment for an indurated acne of the chin had been tried for two months without avail, was on Jan. 3, 1902, exposed to the influence of the X-rays for the first time. Exposures were made three times weekly for a period of ten minutes each at 15 cm. distance, until February 1, when all active lesions had entirely disappeared. The exposures were then reduced to one sitting weekly until March 1, since which time no exposures have been made and no recurrence has taken place. The skin is absolutely free from disease and remains soft, smooth, and perfectly natural. In this case a slight passive pigmentation but no erythema was produced.

CASE 4.—Miss M. R., aged 18, referred to me by Dr. E. I. Kerlin, has been under my observation off and on for two

years for a very severe acne eruption, consisting of comedones, inflammatory papules and pustules involving the forehead, both cheeks, the nose and chin. No particular improvement as the result of treatment had been noted, so March 1, 1902, the first exposure of the X-rays was given; after nine exposures of 10 minutes each at 10 cm., the face had entirely cleared up with the exception of not more than a half-dozen small papules on the forehead when last seen July 1, 1902. An interesting feature in this case was the existence of a goiter which, too, has almost disappeared, apparently due to the effects of the X-rays as no internal or external medication was used while under the X-ray treatment.

CASE 5.—Miss G. B., aged 19, blonde, acne eruption on the face, neck and back existing about 15 months. Between March 1 and April 1 she was given 14 exposures of 10 minutes each at 15 cm., with the result that the eruption disappeared except about the borders of the hair on the neck which was not exposed owing to the known depilatory effects of the X-rays.

CASE 7.—Mrs. D., aged 29, brunette, severe acne of the forehead, cheeks and chin, with rosacea of the nose; eruption existing to greater or less degree for 12 years, the face and nose never in this time presenting an appearance even approaching a normal or healthy condition. Between April 22 and June 4, 1902, twenty exposures to the X-rays were given 10 minutes each at 10 to 15 cm. Exposures were made every other day and resulted in the entire disappearance of the eruption. No dermatitis or erythema was produced in this case, and no tendency to recurrence can be noticed at this writing.

CASE 10.—Mr. W. G., aged 18; indurated acne of the chin existing two years, not severe, but did not improve under ordinary treatment; was given eight exposures of 10 minutes each between February 20 and March 18, resulting in the total disappearance of the eruption with no recurrence up to present writing.

CASE 12.—Miss K., aged 19, eruption of comedones, indurated papules and few pustules involving both cheeks, forehead and nose; has existed for 1 1-2 years and has absolutely resisted all attempts at cure with the ordinary remedies at our command. She was placed under exposures to the X-ray April

3 for the first time, and between this and May 6 was given 15 exposures of 10 minutes each with the tube at a distance of 15 cm. from the seat of exposure. The result was the entire disappearance of the eruption and no evidence of recurrence can be detected.

CASE 13.—Mrs. L., aged 37; severe case of rosacea with comedones, and deep-seated pustules about the nose and extending on to the cheeks; has existed for 4 years; previous treatment has been without effect; general condition very good with the exception of occasional attacks of rheumatism in the arms and wrists. Between Feb. 7 and March 15, 1902, sixteen exposures of 10 minutes each at 15 cm. were made, resulting in the absolute disappearance of the eruption with no evidence of recurrence when the patient was last seen, June 18, 1902.

CASE 14.—Miss M., aged 24, blonde, has had for seven years a very severe indurated acne involving the forehead, cheeks and chin. The lesions though indolent showed but little tendency to the formation of pus. The menstrual periods are regular and free from pain, but the flow is scant. Bowels constipated at times, appetite and digestion good; with this patient previous treatment had been without effect. During January, February and March she was given 33 exposures of 10 minutes each to the X-ray at 10 to 15 cm., with the production of a slight dermatitis, but without any improvement in the local condition. I felt I had finally met with failure and advised the discontinuance of the treatment; the patient reluctantly consented and she returned to her home; on June 24 she wrote me that the eruption on the forehead and cheeks had disappeared, but the lesions on the chin still remain, though somewhat improved.

CASE 15.—Miss K. S., aged 15. Two years ago eruption consisting of comedones, papules, and pustules appeared on the chin and forehead and grew gradually worse until eight months ago, when patient came under my care. At this time the eruption involved the entire face; the effects of treatment were without avail. On March 19, 1902, the first exposure to the influence of the X-rays was given. These were continued every other day for ten minutes each sitting until May 5, during which time 21 exposures were made, resulting in the

entire disappearance of the eruption with the exception of a very few papules on the forehead and which may be found on any person at times.

Comments: The above cases present a most favorable showing for the Ray treatment of a disease, which the detailed history in some of the cases shows is often very intractable to the ordinary methods of treatment. It is interesting to note that Wm. B. Snow reported several cases of Acne as cured by the X-ray in which he used the static breeze in connection as an adjunct. He employed the X-ray on alternate days until a slight redness appeared, discontinuing treatment until the reaction had disappeared. Brush discharge was used on the same days that the rays were employed.

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#### CASES OF CARCINOMA AND SARCOMA TREATED BY ELECTRIC STERILIZATION.

In a previous paper thirty-eight cases had been reported as having been treated under cataphoric diffusion of electrolytic salts of mercury and zinc for destruction and sterilization. In eight cases a cure was obtained. In twenty cases the local disease was removed, but the patient succumbed at once to metastases that were apparently existent at the time of the application. In eight cases, the method had failed to stay the progress of the growth. In two cases, the patients died during treatment. The present article reports fifteen cases. We give in full the history of a few of these cases.

CASE XL.—S. J. C., aged 60, was referred by Dr. C. A. Groff, of Philadelphia, January 22, 1901, with a recurrent carcinoma of the tongue and floor of the mouth. The tongue had been amputated by the knife operation but seven weeks before. This early return, and the extensive and deep infiltration that had so quickly reappeared, rendered all effort apparently hopeless; yet, to give him a last chance, he was admitted to a private room at the Presbyterian Hospital and a major application made to the affected parts, under general anesthesia, 350 to 500 milliamperes being employed for 2¼ hours. This resulted in considerable destruction of the

diseased structures, but not complete sterilization. The growth reappearing later he was referred to Dr. Edward Martin, who removed the tissues of one side of the jaw and neck down to the larynx, with only temporary benefit, the patient shortly succumbing to the disease.

CASE XLI.—Mrs. —, aged 53, was first seen March 5, 1901. At this time there was an irregular growth beneath and involving the right ear, that was about the size of a split cocoanut, but irregular in shape. The lower half of the ear was fused in the growth, which extended forward on the cheek and downward between the jaw and the neck to the angle of the lower jaw. The skin did not seem to be involved, though ulcerated through at one spot, but the immovable base showed a deep infiltration into the structures of the neck. Owing to the patient's unwillingness no photograph was taken. The history of the growth showed an existence of 19 years, including recurrences after two extirpations with the knife and one caustic application. The first cutting operation was performed by the late Dr. Agnew, in 1884. The second operation of the same character was done in 1891, by a well-known surgeon, assisted by Dr. Agnew; in this operation the seventh nerve was severed, resulting in paralysis of the right side of the face. Realizing that I had to deal with a malignant growth of slow progression, and not prone to metastasis, and also with a patient unwilling to take ether again, I decided to try the effect of the minor method of zinc mercury cataphoresis, employing zinc needles amalgamated with mercury and thrust into the growth under cocain diffusion. Small currents were therefore applied daily in this manner for 30 minutes at a time. This treatment has continued over a year, with some interruptions, and is even yet applied once a week through the tiny openings in the skin where the growth was, but the patient is now practically cured, a depressed cicatrix with soft edges occupying the site of the extensive tumor. I shall keep these openings patulous for a time yet, and continue occasional applications to make sure that the last germ of the affection has been destroyed. During the course of the treatment a piece of the tumor was removed and sent to the



Philadelphia Clinical Laboratory, which gave a histologic diagnosis of carcinoma.

CASE XLII.—Mrs. L., aged 63, was first seen in March, 1901, with a large cancerous ulceration occupying the site of the right breast, the growth measuring 11 by 7 inches and extending down to the intercostal spaces. The outer edge of the infiltrated border extended well up into the axilla, but, though the apex of this space was infiltrated and the arm swollen, no glandular nodes were found. This growth was evidently one of the slower-growing class in spite of its great extent, for it had been an open ulceration for more than three years, and had been first noticed nine years before. The patient's general health was profoundly affected, she was confined to her room, pallid and apparently cachectic. The absence of glandular infection and its long duration was, however, taken as an excuse to give her the chance offered by a major application. On April 2, 1901, assisted by Dr. Hermance, she was etherized and the zinc and gold-mercury cataphoresis applied by means of 600 to 700 milliamperes for  $2\frac{1}{4}$  hours. The patient was so weakened by the disease that she did not recuperate from the prolonged anesthesia for several weeks. Her condition was, however, so improved by June 15 that it was decided to attempt further treatment by daily applications of as much as she could bear, applied to the extensive areas of still profoundly diseased structure that could not be reached in the first operation. From 50 to 150 milliamperes were therefore applied with sharp zinc-mercury points during the remainder of June and the whole of July. By August 5, the minor applications having become too painful, a second major application was made under ether, assisted by Dr. Hermance and by Dr. F. G. Du Bose, of Selma, Ala. Eight hundred milliamperes were applied this time for 1 hour and 35 minutes, followed by quick recovery. By November the patient was well enough to make a journey to Brooklyn. In January, 1902, it was, however, seen that an edge remained still diseased between the shoulder joint and the clavicle. A third application was therefore made January 28, 1902, requiring 500 milliamperes for two hours. The patient is now apparently well in every respect, though the large surface that was denuded by the disease has yet a

smaller spot uncitrized than shown in the final photograph. A piece of this growth was removed at the first operation and submitted to microscopic examination at the University Pathologic Laboratory, which reported as follows: "The specimen consists of large nests of epithelial cells contained within a delicate stroma of fibrous tissue. Cells present an epithelial appearance and completely fill alveolar space. Surface of the tumor is necrotic and invaded by leukocytes. Diagnosis: Medullary carcinoma simplex of breast."

CASE XLIII.—Mr. C. A. W., aged 47, was brought to me by Dr. J. T. Rimer, of Clarion, Pa., May 11, 1901, with a large recurrent sarcoma in the left groin and enlarged glands in the right groin. The primary growth had been a sarcoma of the left testicle, which had been removed August 7, 1900, the extension to the groin being noticed three months after the operation. The Coley serum had been thoroughly tried in this case, and resulted in apparently holding it in check and improving the general health for about six months. When seen by me the growth measured 8x5 inches in superficial diameters and lay directly over the femoral artery, the compression of the femoral vein being evidenced by great tumefaction of the thigh. The diseased glands on the opposite side had the same dangerous situation. It was decided to try the cataphoric method, and on May 12 he was placed under ether and from 800 to 1,400 milliamperes employed for three hours. The next morning I found him sitting up in bed reading a paper in spite of this prolonged anesthesia and powerful current. The edema of the leg had subsided. On the separation of the eschar it was, however, noted that some diseased tissue remained in the bottom of the cavity, and as the tumor in the right groin had not been reached at the first application, he was placed under a second, one month after the first. At this time 1,400 milliamperes were again employed for three hours. He reacted well from this operation also, but unfortunately a secondary hemorrhage appeared in the site of the smaller growth, causing death on the fifth day.

Of the above fifteen cases it will be seen that nine patients appeared to be cured, two patients were temporarily helped without arrest of the disease, and four patients died shortly after the application was made. The widely differing char-

acter of these cases and the desperate nature of those terminating fatally give, however, very little ground for a statistical inquiry, the chief value of this report lying in the study of the individual cases described.

Five of the cured patients were demonstrated at the meeting.

(Abstract of an article by G. Betton Massey, M. D., of Philadelphia in the American Medicine )

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## THE TREATMENT OF FRACTURES OF THE LOWER END OF THE RADIUS.

BY CARL BECK, M. D., NEW YORK CITY.

We quote in full the description given in the reduction of the fractures at this point :

"The following method I found most useful in the majority of these cases: The hand of the patient is grasped as in a firm handshaking by the left hand of the surgeon, while the patient's thumb is held by the right hand of the surgeon in such manner that the thumb of the latter presses the fragment downward while the surgeon's index finger presses it inward at the same time. If the direction of displacement is toward the ulna the surgeon grasps the patient's hand, including the thumb, with his own right hand and pushes the fragment outward with his left thumb while he supports the flexor aspect with the rest of his hand. During these manipulations counter-extension must be exerted at the elbow. If it appears to be impossible to reduce the fragment in this manner, anesthesia must be employed. This manner is sometimes facilitated by placing a book or a piece of wood underneath the ulna at the edge of the table.

"I have never failed to reduce the fragments in fractures of this type since the Roentgen rays have become such a reliable adviser. Even in impacted fractures I could always disentangle the interlocked fragments. If there is a simultaneous injury of the lower end of the ulna showing displace-

ment, special care must be taken to press the fragment in its normal place. In multiple fractures, even in the much-dreaded Y-shaped variety, the articular arch of the radius may sometimes be restored by repeated efforts of reposition, controlled and corrected by the Roentgen rays. But if this proves to be impossible speedy osteotomy must be resorted to.

"After reposition is accomplished a fixed dressing must be employed for the purpose of retaining the fragments in the proper position. This is not always easy. I find that no dressing accomplishes the purpose of retaining the fragments better than plaster of paris, since it adapts itself to the contours of the wrist in any desired shape or direction, and can be adapted to the individuality of each case."

#### ISCHEMIA AND GANGRENE NOW AVOIDED.

"Before the Roentgen era the fear of ischemia and gangrene prevented me from using it immediately after the injury. Now, that the premises of ischemia are known to be wanting as soon as the pressure of displaced fragments is removed, such fear is uncalled for. So, while in former years I applied splints first and resorted to the plaster of paris dressing four to seven weeks afterwards, I now apply the plaster dressing immediately after reduction, resorting to the plaster of paris splint treatment a week or two later, as the case may require. If the protruding fragment is not reduced, gangrene of the overlying tissues may be produced by any kind of dressing." Two pictures of a hand were shown (dorsal and ventral view), where pressure gangrene was produced by well padded splints.

#### THE VALUE OF A FLUOROSCOPIC EXAMINATION.

"If the fluoroscope shows imperfect adaption the bandage must be removed and reposition done over again. Under such circumstances the fragments may be better retained if the thumb is pulled in an outward direction while the hand is shifted to the opposite side. The plaster of paris dressing applied in this position resembles the old pistol splint of Nelaton. Of course, the outward bending can be increased ad libitum. A surgeon must not lose patience if his efforts fail several times; by the fluoroscopic guidance he will at last surely find the proper angle, or, in other words, the most suit-

able position and shape of the dressing or splint for his individual case. One mistake often suggests the best mode of correction.

"If the displaced fragment is directed to the ulna, in which case there is generally an outward bending of the ulna present, immobilization is kept up best by turning the hand inward. After a week the dressing must be removed, and if the edema has disappeared a plaster of paris splint, molded after the same principles, may be substituted, which can be taken off temporarily, so that massage treatment may be employed if necessary. The essential part of these splints is the encircling of the thumb, which guarantees absolute immobilization.

"In the case of a woman of 25 years, the lower fragment was turned toward the ulna and also around the axis. It goes without saying that this extraordinary degree of displacement showed considerable deformity. Reposition was accomplished without anesthesia, the wrist being immobilized in superabduction. The skiagraph taken through the plaster of paris dressing showed that the abduction was overdone, wherefore another dressing was applied in moderate abduction. This position showed the fragment in better coaptation, but there was a tendency of the ulnar side of the fragment to project upward, partially filling up the interosseous space. Elastic pressure, recommended by me in the treatment of metacarpal, as well as of metatarsal, fracture, also proved to be useful in this case. A small piece of rubber drainage tube (the diameter of a small pencil) was placed alongside the interosseous space and fastened with a small strip of adhesive plaster." The case had an uneventful recovery, with perfect use of the hand.

#### THE AID OF THE RAYS IN INTRA-ARTICULAR FRACTURES.

"Among all the different varieties of fractures of the lower end of the radius these intra-articular injuries are most serious. It is only the continuous control by the aid of the Roentgen rays of the proper position of the fragments which will promise a fair result. In the case of considerable comminution a perfect restitutio in integrum can not be promised. A skiagraph taken at the earliest possible moment is a valuable document for the surgeon, since it proves the great diffi-

culty—sometimes impossibility—of perfect reposition of the splinters.

"I confess freely that I often thought I had reduced a displaced fragment thoroughly because palpation seemed to give thorough satisfaction. But I was sometimes not a little surprised that the Roentgen plate showed me most impolitely how ill I had succeeded in my alleged reposition. In a former publication on the subject I had advised as a method of self-education to draw an anatomic sketch of one's silent diagnosis and then compare it with the skiagraph. Thus we learn on one hand that we can not always depend even on a highly cultivated palpatory talent, and on the other hand, we are taught to improve the power of judgment by comparing our sketch with the lifelike picture as it is given to us by the Roentgen rays. There is no doubt that the same good results can be obtained by other methods of immobilization, provided they are preceded by proper reposition controlled by the Roentgen light."—*From the Journal of the American Medical Association.*

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#### ELECTRIC SHOCKS.

This paper, read before the Institute of Electrical Engineers by a layman, contains many interesting points. He discusses the following questions: 1. Is everyone equally susceptible to an electric shock? He holds there is no absolute proof as to this. His own opinion is that not only different people are differently affected, but the same persons under different conditions do not feel the same effects. 2. Is a person suffering from disease more likely to be fatally injured by an electric shock than a person in good health? He finds that apparently a low grade of intellect seems to favor insensibility to electricity. The brain does not so quickly react. He has also observed persons suffering from kidney disease to be specially sensitive. This seems to indicate that the resistance of the body may be altered by disease. As regards the question, whether the physiologic condition at the time shock is received makes any difference, he quotes cases that seem to show that free perspiration seemed to shunt off the electricity, making the matter much less serious than would otherwise be the case. Also, drunken people seem to be less likely

to fatal accidents, though the evidence is not very strong; similarly, people that are asleep. He arranged once for his assistant to give him a shock when he was in bed asleep, and though two witnesses guaranteed the assistant had done so, he felt nothing. In one case a man who was stationed to watch a cable carrying 5,000 volts went to sleep and fell upon it. He was most severely burned, but was not killed. Aspinall seems to think that the passage which the current takes through the body has an effect as regards fatality, and that the left side is more vulnerable than the right, and gives evidences. He believes the reason is that the valves of the heart on that side are more easily damaged. The amount of contact and the effect of burning as having an influence on the fatality of the shock, is discussed. He thinks that a person could probably kill himself with a smaller voltage with large contact. Burns, he thinks, may have a good effect, increasing the resistance. In most of the cases he noticed the fatal effects were where the burns were slight. His opinion is that moistness of the skin reduces the chance of burning, as it insures better contact; if no burning takes place, efforts to help the victim should be redoubled, when it is thought he has received a shock, though severe burning may occur after a sufficient current to kill has been received. He is also inclined to think that the fatal shock may not destroy consciousness and the person be able to speak before he succumbs; he reports a case indicating this. The peculiar cry which usually attends the severe electric shock is not absolutely inviolable, as in one instance he did not observe it. As regards the effect of the alternating and direct currents, he is rather inclined to think the direct current possibly a little more fatal. It will much more quickly break down any fault in conduction than the alternating current, but if otherwise the conditions are the same, both currents will kill a man equally well. If death occurs from an electric shock, both are equally dangerous; if death occurs from burns, the direct current is worse; while burns themselves are protections, in his opinion, they may yet be severe enough to cause death. As regards the actual voltage required to cause death, he would say that "at below 600 volts the conditions must be abnormally favorable; at below 1,000 volts they must be favorable,

and at above 1,000 volts, the higher the pressure the more easy it is to get the conditions necessary to cause death." On the whole, there is really not much more danger in one system than another; it is purely a question of voltage. He asks if medical men cannot give us more certain methods of ascertaining whether a man is dead or not from an electric shock; the lack of this is unfortunate, and he inquires if anything more can be done to help people that have received shocks. He wants to know what it is that breaks down when the shock is received. Is it the lungs, the heart, the blood, or the brain? Electricity, in his opinion, acts somewhat as an anesthetic like chloroform, and he has seen two cases where death was expected, but where the men recovered from the head being lowered, thus flushing the brain with the blood as is done in cases of chloroform asphyxia. He asks: Should we adopt the same treatment before applying artificial respiration, namely, hold the body a few seconds head downwards?

(From the N. Y. Medical Record.)

#### THE LIMITATIONS OF THE X-RAY IN THE TREATMENT OF CANCER.\*

In 75 cases of malignant tumors treated by the X-ray, 27 were sarcomata, and 20 were cases of cancer of the breast. Five round celled sarcoma were entirely cured. In 16 of the cancers of the breast, the disease was recurrent and inoperable. Recurrent nodules often disappeared under the treatment of the ray, but soon reappeared, proving that although the X-ray exerted a marked influence, it did not cure the disease. Not a single case of cancer has remained well sufficiently long to consider it a cure. The X-ray treatment should be limited to inoperable cases.

The treatment is at present only in the experimental state. It must be admitted that two-thirds of the cases of cancer recur after operation, and these cases might be treated with the X-ray. Not a single case of cancer of the breast that he had treated was entirely cured, although the treatment had been kept up for eight months in some cases. The so-called cures in the X-ray treatment should be subjected to the

\*Paper read by Wm. B. Coley, M. D., before the Medical Society of the County of New York, abstracted in the New York Medical Record.



same standards as operative cases are, and then the high percentage in favor of the treatment would not be so fortunate.

Dr. A. B. Johnson agreed with Dr. Coley. He had apparently cured a few cases of sarcoma, but none of carcinoma. Some of his cases had developed carcinoma of the liver under treatment and also nodules in vicinity of the original growth, although no screen was used. He believed that the X-rays have no influence on the spread of the disease, even when the local lesions improved.

Dr. H. Lilienthal, held that the X-ray should be used after and not before an operation in operable cancer. It should be used on all other cases. For example, in an infiltrating carcinoma of the jaw involving the soft parts and the glands of the neck. Operation would only produce disfigurement and might shorten life.

Dr. Frank Torek said that although he obtained satisfactory results in superficial epithelioma, he believed that it failed in deep cancer. Such cases should receive surgical treatment and should then be treated with the X-ray.

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#### A CASE OF CANCER OF THE LARYNX CURED BY THE X-RAYS.

BY W. SCHEPPEGRELL, A. M., M. D., New Orleans.

The patient aged 57 years; of robust build; occupation, a lawyer. About six months before examination hoarseness had developed which was gradually becoming worse and was beginning to interfere with the practice of his profession.

*Examination.*—Mouth and pharynx normal; larynx on the left side congested; tumor of the left wall involving left vocal cord and projecting slightly into the glottic space; respiration not impeded; left vocal cord was paralyzed.

Tuberculosis and syphilis were excluded. Patient was not able to begin treatment for two months after the examination, at which time the odor so characteristic of cancerous diseases was marked. Ulceration had set in, giving it a typical picture of carcinoma. Glands not yet involved.

Operation was advised but was refused. X-ray treatment was then begun. Medium vacuum tube was selected; ener-

gized by Tesla coil. Face and chest protected with especially prepared paraffin paper, but lead foil was not used because it was not desired to limit the rays to the diseased area alone.

It was deemed necessary to subject to the treatment the neighboring tissues and the lymphatic glands. The head of the patient was bent well back so as to thoroughly expose the neck to the X-rays which would then pass directly through the skin and the thyroid cartilage into the diseased tissues. Distance of anode, 15 inches; afterwards reduced to 7 inches. First exposure, ten minutes. Like treatments every successive day for twenty treatments. Dermatitis did not develop at any time. The anode was at a dull red heat, vacuum was maintained constant for the treatment.

We copy in full the subsequent history of the case:

"At the end of the third week, the outlook did not appear encouraging. In fact, the congestion of the surrounding area appeared more marked, and the tumor showed no signs of diminution. The only feature which offered any encouragement up to this stage was the fact that the pain had disappeared after the second exposure and did not recur in spite of the appearance of greater congestion in the larynx. After the twentieth application, the patient was sent home with instructions to report ten days later, it being understood that unless some marked benefit from the treatment could be demonstrated by that time no further effort would be made to continue the treatment by means of the X-rays.

On the sixth day I received a letter from the wife of the patient, stating that her husband appeared to be considerably worse, that he had fever, that the expectoration had been much greater and was accompanied with clots of blood, and the pain was more acute. She desired to know if her husband should call at the appointed time. I immediately replied that the patient should not return for treatment until he was considered sufficiently well by his family physician.

A few days later, however, I received a letter from the patient himself, stating that he believed that he had been benefited, that he felt well enough to come to New Orleans, and that he would be at my office at the appointed time. On July 24th the patient called in company with his family physician. I had been so discouraged by the report which I had received

of his condition that I excepted to advise his returning home at once.

When I examined his throat, however, the laryngoscope gave such a changed picture of his larynx that it was almost incredible. The whole mass that had projected into the lumen of the larynx had disappeared, including also a large portion of the left vocal cord, which had been involved in the malignant process. All difficulty of respiration had disappeared and also the pain. The expectoration was still present, but had lost its purulent character and was mucous and only occasionally streaked with blood. The temperature was again normal. The patient asserted that he felt decidedly better, which was easily borne out by his appearance. The excessive expectoration, the clots, and the fever had evidently been simply incident to the sloughing process of the tumor, which apparently had completely disappeared.

The treatment with the X-rays was at once recommenced and continued for ten days longer, at which time the ulceration in the larynx had completely healed. The patient was requested to return again from time to time, to watch not only for recurrence of the growth, but also for infection through the lymphatic circulation, which might have taken place.

On August 29th, the patient was seen for the last time, there not having been any recurrence of the tumor or any change in the larynx indicating an incomplete recovery from the malignant disease.

Of course, the possibility of a recurrence cannot yet be excluded, but the manner in which the disease was cured offers much encouragement that the result will be permanent. In surgical procedures we can never be certain, in spite of the most radical operation, that absorption has not taken place into tissues not reached by the knife, and that recurrence may not originate from this source. In this case, however, the same agent which destroyed the vitality of the malignant growth and caused it to slough must have been equally effective in all the surrounding tissues exposed to the rays, so that there is every probability of a permanent cure.

The case here reported I believe to be the first of a malignant disease of the larynx cured through the agency of the X-rays.

It not only shows the efficacy of this remarkable agent, but is also strong presumptive proof of the bacterial character of malignant disease, as I believe that it is in this way that it effects its cures. Since the X-rays were so efficient in this case of cancer, when they had to pass, not only through the skin, but also the cartilaginous covering of the laryngeal cavity, decided proof is afforded of the efficacy of this form of treatment, and hope held out that they may yet be a safe and effective method for the treatment of even more deep-seated disease.

*Addendum, October 25, 1902.*—The patient was again examined in my office, October 23rd, and was found to be in such excellent condition that no treatment was deemed necessary. The aphonia, due to the loss of tissue of the left vocal cord, has been partially overcome by compensation by the remaining cord. I had advised the patient to adopt a low chest tone, which favored the adaptation of the vocal apparatus to its defective mechanism, but which the patient had at first found very difficult. By constant practice this has gradually improved, so that the voice has now recovered so far that the patient has resumed his practice of law.—From the New York Medical Journal.



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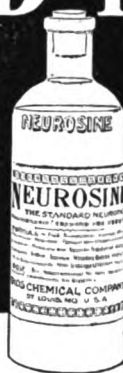
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# American Electro-Therapeutic and X-Ray Era

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## Original Contributions

### THE X-RAY AS A DIAGNOSTIC AGENT IN TWO OBSCURE LESIONS—IMPROVEMENT IN A TUBERCULAR JOINT UNDER RADIATION.

BY DR. RUSSELL H. BOGGS, EMPIRE BUILDING, PITTSBURG, PA.

CASE I.—Mr. J. H., aged 29, has had the diseases of childhood, and seven years before admission to the Allegheny General Hospital, contracted syphilis. He had used alcohol to excess until three months before his admission to the hospital, and tobacco incessantly.

When four years of age this patient was struck above the right eye, but recovered from the injury without any surgical interference. Two months before admission to the hospital he began to complain of pain over the right eye and ear; staggering when walking; insomnia, partial loss of memory; and occasional attacks of vomiting, which were becoming more frequent. There was a small pulsating tumor over right eye.

Examination by Dr. Duncan revealed atrophy of the optic nerve of both eyes; blood vessels reduced to one-half the normal size, and paresis of the ocular-motor nerves. The urine, specific gravity 1028, contained a few white blood corpuscles but no sugar or albumen. This patient was put on ascending doses of potassium iodide which was continued until he was taking one dram three times a day.

This case was referred by Drs. King and McAbey for an X-ray examination. A radiograph was taken which showed



the abnormal dark shadow on the plate, or a light shadow on the print, extending from the antero-temporal to the posterior occipital region as shown by the radiograph.

No diagnosis was made, but the radiograph (See Fig 1.) would suggest that some degeneration of the table of the skull had taken place; because, in order to have a darker shadow on the plate or a lighter shadow on the print there must be a lesser density where this shadow occurs on the radiograph than in the surrounding tissues. This radio-



FIG. 1.

graph was verified by two others, so the shadow could not have been produced by an imperfection in the plate.

CASE II.—Mr. O., age 23, victim of peculiar attacks since July, 1902, occurring on an average of five or six times a day, but lately only at night. These attacks lasting from three-quarters of a minute to a minute, with the jaws tightly closed, tongue not bitten, preceded by no headache or cry, but followed by drowsiness. He always presses his hands over head and face during an attack.

On examination his pupils were found to be large and mo-

bile, reflexes normal, heart-beat rapid and strong, but his left lung was not performing its functions properly. There was an elevation of temperature every day from 1-5 to 4-5 of a degree.

This case was referred by Dr. McKennan to verify his diagnosis that the left lung was not performing its functions properly; however, no dullness was found on percussion. The

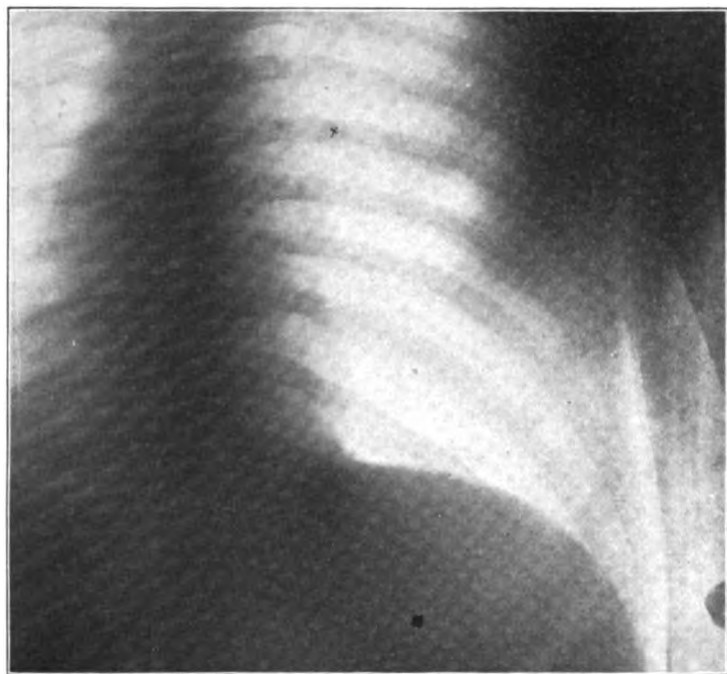


FIG. 2.

diagnosis was epilepsy, caused by tubercular trouble in the brain.

A radiograph was taken (See Fig. 2.) which showed a solid spot in the left lung about the size of a dollar. In order to take this picture while the lung was at rest it was necessary to make a short exposure, which was twenty seconds with 40 amperes going through the primary of a fifteen inch coil. **This exceedingly heavy discharge was passed through a medium tube placed at a distance of twenty-four inches from the plate.**

CASE III.—Miss C., age 16, had been healthy and attending school when an abscess appeared at her elbow joint. The physician lanced the abscess, but as it had not healed three months later, he referred the patient for an X-ray examination, as there was a certain amount of ankylosis. The mother and aunt of this patient died of pulmonary tuberculosis.

A radiograph (See Fig. 3) revealed a tubercular joint, the lower end of the humerus being involved. X-ray therapy was decided upon and a treatment was given every other

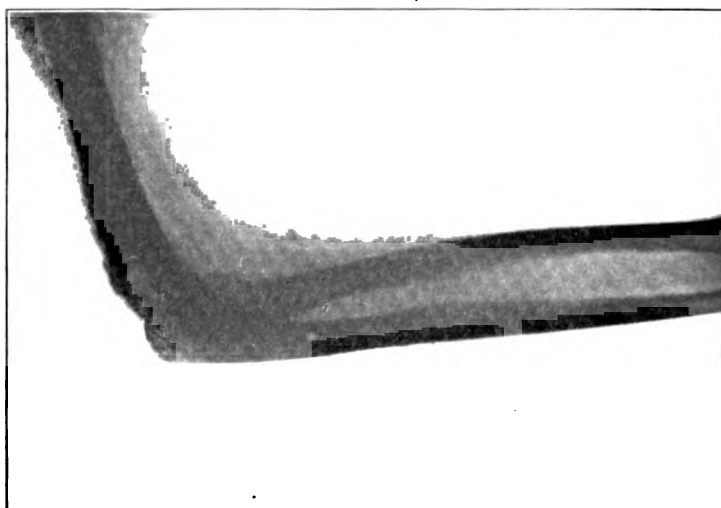


FIG. 3.

day for a period of six weeks. A fifteen inch coil with from eight to ten amperes going through primary, and a low tube which would back up a spark of two and a half inches was used. The sittings at first were of five minutes duration, but were soon increased to ten minutes. About the time the radiograph was taken an abscess appeared just above left breast; this abscess was given the same treatment.

At the end of six weeks the patient left the city, much improved and intends to follow up the treatment on her return.



## ELECTRICITY IN GYNECOLOGY. \*

BY EMIL H. GRUBBE, B. S., M. D., CHICAGO, ILL.

Professor of Radiography, X-Ray Therapeutics, and Electrophysics, Illinois School of Electrotherapeutics; Chief Radiographer, Illinois X-Ray and Electrotherapeutic Laboratory, Etc.

The value of electricity in medicine is daily more and more appreciated.

If we recognize the statements made by such eminent men as Apostoli, Sir Spencer Wells, Thomas Keith, Massey, Goffe and Franklin H. Martin, we must conclude that no department of medicine has benefited more through the application of electricity than that of Gynecology.

The writer does not intend to give an exhaustive study of all the various uses to which electricity may be applied in this particular branch of medicine, but simply histories and reports of cases treated by electricity in one form or other, viz.: Galvanism, Faradism, Static Electricity or X-rays.

In treating this class of cases of course it must always be remembered that the personal equation enters largely as a factor in obtaining **good results**. One operator exercising care and common **sense will** obtain results which will be impossible to another **who is** reckless and who uses a stereotyped form of treatment for all cases, ignoring entirely the matter of individuality.

The fact that most of the cases reported here were made well by electric treatment alone, is not brought out for the purpose of conveying the idea that electric treatment is infallible or that it is a panacea. Not at all. Our object is merely to hold it up for inspection, for in selected cases electricity has its field and is able to cope with other therapeutic measures for recognition in the treatment of organic as well as functional diseases of women.

### GALVANISM.

The field which Galvanism occupies in the treatment of pelvic diseases is quite extensive. For, we have in the opposite action of the Galvanic poles ability to treat local hyperaemic

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\* Paper read before the Chicago Electro-Medical Society, March 31st, 1903.

conditions as well as local anaemic conditions. With the positive pole we are able to control and limit the circulation of an organ because of the well known vaso-constrictor property possessed by this pole. On the other hand, by means of the negative pole we may dilate the blood vessels of an organ and thus establish ability to take care of the products of metabolism.

We have used Galvanism with great success in many uterine and pelvic troubles, viz.: amenorrhea, dysmenorrhea, fibroid tumors, inflammatory states of the uterus and its appendages, stricture of the os uteri and of the urethra, and also in the treatment of the results of that worst enemy to woman's health—gonorrhea.

Galvanism has been especially successfully applied to the various menstrual disorders.

When we remember that menstruation is a nervous phenomena, that its rhythmic order is due to and is controlled by the sympathetic nervous system, which in turn controls the glandular as well as the vascular systems, we can readily understand why electricity, which affects primarily the nervous system, should bring about good results.

CASE I.—*Menorrhagia*—due to interstitial uterine fibroids. Miss C., aged 36, had suffered for five years with intense colicky pains at the menstrual period, which occurred every 30 days. Pain usually so severe that regular confinement in bed for 4 days was necessary. At times she would become unconscious from pain. Profuse hemorrhages occurred after establishment of the period, and occasionally between the periods. Examination disclosed uterine fibroid affecting the anterior uterine wall just within the internal os. Due to the fact that the growth was not very large and the patient did not care to undergo a surgical operation, Galvanism was resorted to. Personally we believed in this case the current would be rather palliative than curative, but after treatment extending over a period of four months most of her symptoms had disappeared and she considers herself comparatively well. Local examination now does not disclose the fibrous formation in the uterus. Her pains are practically gone and therefore we are led to believe that Galvanic current has actually cured her.

The technique of the treatment was as follows: A copper olive slightly smaller than the caliber of the os was inserted into the uterine cavity and attached to the positive pole of the Galvanic circuit. A large felt electrode (10-in. diameter) and attached to the negative pole was placed over the pubis. Gradually the rheostat was cut out until the patient was receiving 30 mill. amp. The seance lasting 10 minutes. Treatments were given twice each week. The risk of doing any harm by this method is reduced to a minimum. No doubt when surgical operation is refused it is the best expectant treatment which we possess at the present time, and is to be preferred to drugs or curettage.

It is very necessary in giving this treatment to remember that electrolysis and not cauterization is desired. Mild currents given for a long period of time will, due to the cutting off of blood supply, favor absorption of abnormal tissues. Strong currents burn and even destroy normal tissue and therefore should not be used unless a cauterizing effect is desired, which is hardly allowable in the treatment of these conditions.

CASE II.—*Dysmenorrhea*—due to cervical stenosis. Mrs. M., aged 28. Menstruates every 28 days. Never been pregnant. This patient complained of premenstrual pain in the pelvic region. These pains were always paroxysmal, expulsive "cramplike," radiating through pelvis, back and thighs, and accompanied with nausea. Pains would come on several hours before flow was expected and continued throughout the period. Examination four days after menstrual period revealed stenosis of the uterine canal. Treatment: A nickel olive of suitable size was selected and attached to the negative pole of the Galvanic circuit and introduced into the cervical canal. 10 mill. amp. were given for 8 minutes when the olive had passed into the uterus. This treatment was repeated every other day, each time using, if possible, an olive of larger caliber, until six treatments had been given. At the next period very slight pain or discomfort was experienced and after the period the patient returned for three more treatments. By this time the canal was considered sufficiently dilated to stop treatments. This patient reports frequently, but has had no return of the dysmenorrhea.

CASE III.—*Dysmenorrhea—membraneous.* Mrs. G., aged 32. For years this patient had been troubled with membraneous dysmenorrhea, and although she had consulted many physicians and tried many forms of treatment, she had received comparatively little benefit. She complained of labor-like pains commencing with the flow and increasing in severity until shreds of a thin membrane passed. Following this for two days there appeared a purulent discharge. She had refused curettage and caustic treatment, but was finally convinced that Galvanic cauterization, i. e., electric curettage, could be performed without occasioning much pain, and she consented to try it.

Treatment: Two weeks preceding the menstrual period Galvanism was resorted to. An intra-uterine electrode of copper attached to the negative pole was inserted and gradually the rheostat was cut out until 60 mill. amp. were allowed to pass—the seance lasting 20 minutes. The current was now turned off and the electrode forcibly withdrawn. This same treatment was repeated the third day following and again three days later. At the next period the usual labor-like pains had been replaced by very mild pains and no membrane was passed. Treatments were continued as before and the following period was passed without the development of any disagreeable symptoms. At the present writing four periods have been passed in comfort and without the appearance of any membrane and we may say the patient is cured of her trouble.

CASE IV.—*Acute vulvo-vaginitis—due to gonorrhea.* Miss R., aged 26. Patient complained of dull pain in groin. Burning and intense itching in vagina accompanied by profuse discharge. Local examination revealed decided inflammation and tenderness over entire vulval and vaginal mucous membrane; profuse yellow discharge, which upon analysis was found to contain gonococci. Treatment: Mucous surfaces were thoroughly cleansed with hot saturated solution of boric acid. A large copper vaginal electrode was attached to the positive pole of the Galvanic circuit and then placed in contact with all accessible parts of the vaginal mucous membrane until a decided green color was developed in the tissues—the electrode was moved from place to place until all the dis-

eased surface had been treated. Due to the large surface treated at one sitting considerable pain developed. Heroic treatment, however, was allowable, considering the character of the disease. The vagina was then packed with plain gauze and the patient was asked to return in three days. Even though the treatment had been vigorous the patient reported much improvement and was perfectly willing to undergo similar treatment if found necessary. On examination several small inflammatory areas were detected and the previous treatment was again resorted to. One week later the patient returned for examination and no symptoms could be obtained. The patient has presented herself for examination several times since and no return of disease has occurred.

CASE V.—*Urinary Fistula.* Mrs. R., aged 21. This patient complained of dribbling of urine from the vagina. This condition existed since the birth of her first child over a year ago. Upon examination the vaginal mucous membrane was found very much excoriated. The vaginal walls were extremely tender to the touch and upon the anterior border a small elongated tear indicated urethral communication. Treatment: The vulva and vagina were carefully cleansed with warm boric acid solution. Fistular area carefully cleansed with the same solution, and a copper wire electrode the size of the fistulous opening attached to the positive pole of the Galvanic circuit applied. 20 mill, amp. of current was allowed to pass for 10 minutes. This was sufficient to cause a considerable quantity of copper to decompose in the fistulous tract, the walls of the cavity appearing green in color. The vagina was then packed with plain gauze to prevent further excoriation of vaginal mucous membrane. This procedure was repeated in a week, during which time the patient was very much improved. One week later a third application was made in the same manner and one week later the patient returned perfectly well, every symptom having disappeared.

#### FARADISM.

The use of Faradism is somewhat more limited than Galvanism in Gynecology. The Faradic current is purely functional in its action, whereas the Galvanic current has a func-



tional as well as an organic or chemic effect upon the tissues to which it may be applied.

Faradism is of decided value whenever we wish to restore the functions of muscular tissues. Such affections as prolapsis, subinvolution, versions and flexions and undevelopment of the uterus are favorably influenced by this form of electricity.

CASE VI.—*Subinvolution.* Mrs. G., aged 25. Patient said she had been exceptionally well until the birth of her child seven months ago. Since then she has complained of backache and pains in the pelvis, bearing down and feeling as though something could be pushed out of the vagina. Has had constant discharge usually of yellow color, but sometimes also bloody. Feels very weak; is unable to do housework. Has lost considerable flesh: Bowel movements very irregular, usually constipated, also irritability of bladder. Examination: Uterus very much enlarged, extremely sensitive and filling almost entire vaginal cavity. Os considerably dilated and discharging profusely. Treatment: By means of a bipolar intra-uterine electrode applications of Faradic electricity were made daily, using slow interruptions (50 per minute) from the secondary coil for 15 minutes. After 20 applications practically all symptoms for which the patient sought relief had disappeared and she was discharged well.

CASE VII.—*Infantile Uterus.* Miss V., aged 30. Did not begin menstruating until she was 20 years old. Since then has had very irregular and painful periods and the flow has been very scanty. Was well nourished, and considered herself quite well until two years ago, when she began to show signs of anemia. Was getting rapidly worse. Pulmonary tuberculosis was suspicioned, but examination was negative. Pelvic examination revealed a small, imperfectly developed uterus about the size of her thumb. No discharge and no inflammatory process could be found. The conclusion was that all her trouble was due to a defective development of the uterus.

Realizing that someone has said that patients of this class are "usually a burden to themselves and may be considered useless to society," we undertook to treat this patient with some trepidation. Indeed we promised nothing. An extra small bipolar intra-uterine electrode was introduced into the

uterus and connected to the primary coil of the Faradic circuit. Slow contractions were produced (20 per minute). The treatments lasted 10 minutes each. After four months of this treatment, during which 30 seances were given, the uterus has developed twice in size, the periods have now been regular for three months, the flow has been quite free each time and the patient has gained 20 pounds in flesh. Indeed she feels so well that she has changed her idea of life and is seriously contemplating marriage.

STATIC ELECTRICITY.

We possess in Static Electricity a very valuable therapeutic measure. It is used principally as a function regulator and as such is one of the greatest stimulants and tonics known. Many of the ailments of women are due to disturbed normal circulation; are purely functional and therefore any agent which can equalize the circulation must be deemed of decided value in the treatment of gynecological cases.

CASE VIII.—*Chronic Constipation*—due to inactivity of the lower bowel. Mrs. A., aged 38. This patient had been troubled with constipation for nearly 15 years. Would not have a bowel movement in two or three days unless large quantities of cathartic medicines or enemas were resorted to. Three years ago she had an operation for the removal of one ovary, following which extensive adhesions involving the bowel occurred which aggravated the constipated condition very much and caused intense pains at intervals. She was referred to us for electric treatment in the hope that the pelvic adhesions and general inactivity of the bowel could be remedied. After examination we decided to apply Static surgings locally to the rectum. The patient was placed upon an insulated table and lying on her side, an ordinary copper rectal electrode was inserted. This electrode was attached to one pole of the Static machine, the other being grounded. In giving this treatment small sized Leyden jars are attached to the machine; the prime conductors are placed about one-fourth inch apart and gradually withdrawn until pronounced muscular contractions occur with the passage of each spark between the prime conductors. The machine should be run very slowly; only about 30 to 40 sparks should pass per minute. Treatment lasts

5 to 10 minutes, according to individuality. After receiving twelve surging treatments this patient considered herself entirely relieved from constipation, in fact, she has not found it necessary to resort to cathartics or enemas once during the past three months.

CASE IX.—*Pelvic Adhesions*—following operations. Mrs. V., aged 20. Operated upon over a year ago for a left ovarian cyst. Following this operation adhesions developed to such an extent that another operation was performed, as she presumes, for the relief of the adhesions. No relief followed. Six months ago her physician decided that electricity offered the only hope of relieving her condition. Upon examination patient complained of obscure pains in the pelvis, referred sometimes to the uterus and at other times to the left ovarian region. The entire abdominal and pelvic regions were extremely sensitive to the touch. Vaginal examination revealed extensive band-like adhesions on the left side. Careful examination of the mental condition of this patient was also made to eliminate the factor of hysteria, which is many times a post-operative development. This examination, however, was entirely negative and the conclusion was that her pains were actual and entirely due to the adhesions in the pelvic cavity. Her treatment consisted of the use of both Static surgings and negative Galvanism. The Galvanic current was administered locally through a vaginal electrode placed in contact with the adhesion bands, using 10 mill. amp. for 10 minutes every other day. The Static surgings were applied by placing a metal band around the pelvis, next to the skin and this band then connected to the machine. This current was alternated with the Galvanic. Decided benefit followed a few treatments, but due to the fact that the patient had to leave the city our report is incomplete in this case.

#### X-RAYS.

CASE X.—*Epithelioma of the Cervix*. Mrs. G., aged 40. This patient gave the classic history which is so characteristic of epithelioma. Married at 20. First child at 22; laceration of cervix resulted, but was never repaired. Frequent miscarriages for several years; several of them self-produced, followed by another birth and more lacerations. Leucorrhea

ever since first birth. Patient finally became so weak that local treatments were undertaken and an "ulcer" of the cervix was discovered. This, however, did not get well under treatment and patient became discouraged and stopped all medical treatment for three years. Her friends implored her to seek aid again and on doing so her physician discovered an extensive ulcer, a portion of which upon analysis proved to be an epithelioma. The patient was now sent to us for X-ray treatment. Since the parts were readily exposed to view through the speculum, it was thought advisable to apply the X-ray per speculum. For this purpose a celluloid Ferguson speculum was used walling off the vaginal mucous membrane. Externally the neighboring parts were protected by X-ray foil. We believe in "burning" all ulcerated surfaces under X-ray treatment and therefore applied the ray in a vigorous manner. After twelve exposures a slight irritation made itself manifest and after twenty treatments the "burn" appeared so decided that further treatment was postponed. The patient was told to return for examination weekly and after three months the "burn," as well as the epithelioma, had entirely disappeared.

We have had several similar cases, in all of which "symptomatic" cures have been performed. Whether these cures will be permanent or not time only can determine. If, however, the primary condition should return, we can resort to the X-ray again.

CASE XI.—*Epithelioma of the Vulva.* Miss L., aged 29. Three years ago patient noticed a small, hard, warty growth upon the vaginal wall near the clitoris. The growth was not very painful and therefore was given only passing attention. However, in the course of six months after she first discovered her condition she became gradually worse and upon consulting a physician was told that an ulcer had formed and since he did not suspect anything but syphilis she was accordingly treated for specific trouble. After remaining under this treatment for several months no improvement could be detected, in fact, she was gradually growing worse. Finally a section of the growth was made and upon analysis epithelioma was diagnosed. X-ray treatment was advised and undertaken, the technique being much the same as in the previous case.

After ten daily treatments decided inflammatory symptoms developed and further treatment was postponed until this had subsided. After 15 days a decided change for the better could be seen and the X-ray treatments were again applied. Eight daily seances were given before the "burn" appeared the second time. Again she rested and after three weeks both the "burn" and epithelioma had disappeared.

CASE XII.—*Carcinoma of Uterus.* Mrs. N., aged 47. Previous history good. Believes her mother died from cancer of the breast. About three years ago this patient passed through the "climacteris period" and had no symptoms until 10 months ago when repeated hemorrhages accompanied by deep uterine pain occurred. This was considered a final windup of the menstrual life and no attention was therefore paid to the condition. Patient grew rapidly weaker and hemorrhages were followed by a profuse discharge of pieces of tissue having a very foul odor. On consulting her physician the diagnosis of carcinoma of the body of the uterus with metastasis was made. The condition of the patient was such that surgical operation was contraindicated. The patient was informed of the seriousness of her trouble and also that X-ray treatment might be tried, not as a curative measure, but to relieve the hemorrhages and pain, and to make her somewhat comfortable while she awaited the end. After six X-ray treatments the hemorrhages ceased and much of her pain had disappeared. Treatments were continued daily for forty-five days, during which time the patient was almost free from disagreeable symptoms. General carcinosis having set in long ago, of course the end was only a matter of time and she finally died.

This case illustrates very clearly how little care or attention women give to themselves. No doubt if this case had been placed under surgical treatment early enough and the operation followed by X-ray treatment the outcome would have been very different. It teaches also that conditions which cause repeated hemorrhages need early attention, since they are largely indicative of malignancy in the uterine cavity. We believe there is no excuse for procrastination in dealing with conditions that may sooner or later destroy the life of the individual affected.

In conclusion I wish to say that we are aware of the fact that many criticisms have been expressed by those who have not had personal experience with electric methods and whose criticisms for this reason have been largely unjust. It should be remembered that electricity is only one of many remedies in alleviating human ailments and when it is correctly used in properly selected cases it is of considerable value.

DISCUSSION.

Dr. Neiswanger rose to a question of privilege and stated that he had not seen the last issue of the "American Electro-Therapeutic and X-Ray Era" until a few minutes ago, when several members of the society had called his attention to the criticisms of the editor of that journal upon the paper he had read at a previous meeting. He was surprised to note that these criticisms appeared *in the body of the article*.

In justice to the editor he thought this may have occurred through ignorance of customary usage and not a desire (as some had stated) to belittle the writer of the paper. Dr. Grubbe had read an excellent paper to-night upon a kindred subject and had voiced the very sentiments of the paper referred to, which the editor had seen fit to criticise in such an unseemly manner. He sincerely hoped, for the good of the society, that if the editor of the "Era" had comments to make on Dr. Grubbe's paper, they would be placed where editorial comments belong.

Dr. Grubbe's paper is a valuable contribution, as it gives results of careful scientific work. For a long time the negative pole was used in the treatment of uterine fibroids, in fact Apostolli used this pole, but it was necessary to employ currents of large amperage which produced considerable sloughing of the tissues. Now the positive pole is used in the treatment of these tumors. For some years past he had used the positive pole in these cases. He is not sure but that this form of treatment was original with him. He was led to use it because the positive pole is a powerful vaso-constructor.

These tumors are richly supplied with blood vessels and lymphatics. The positive pole cuts off their nourishment and they behave just as all benign tumors when their supply is

interfered with—they retrograde. In several cases of membranous dysmenorrhea (and such cases were especially worthy of mention as they had been called incurable) he had found them very tractable to treatment under the negative pole, as the essayist had outlined.

The lamp exhibited by Mr. Anton Frank had hollow electrodes of iron which were kept cool by a stream of water circulating through them. The light generated was of a dazzling brilliancy, but was especially rich in the violet and ultra violet rays as had been determined by a spectroscope. The lamp did not become heated, although 10 amperes were passing through it. It could be used in connection with a ray with the X-ray treatment upon superficial dermatosis.



### A CASE OF HIP-JOINT DISEASE.

BY H. S. KELLER, M. D., PRESIDENT OF BOARD OF U. S. EXAMINING SURGEONS, FRANKFORT, KY.

Considering the improved general and local condition in this case, and the fact that the environment and habits of the patient were always the same, a definite and permanent improvement can be claimed as the result of the Roentgen rays.

The child, a girl aged six years, has been under my care since birth; born of parents past forty, with eleven years intervening since previous child.

There was a marked and persistent anemia, club-nails; teeth are soft and decay as soon as they appear; profuse perspiration about the head and neck, often becoming general.

About four years ago, began to suffer with shifting pains, more particularly in fingers and toes, which would at times

become red and swollen. Had an irregular temperature, often as high as 103 degrees. About fifteen months ago, pain appeared and persisted in right knee, soon followed by night cries; later by obliteration of one of the gluteal folds and flattening. Fixation of the joint was soon rejected on account of the complaints of child, and the parents determined to try other measures. An abscess soon developed and opened about juncture of upper and middle third of thigh. This continued to discharge pus for five months, when I began the exposures to the Roentgen Rays, July 1st, 1902.

She received an exposure at ten inches over joint and course of sinus from a medium low tube of from seven to ten minutes, every other day. The tissues exposed became *a very dark* brown and have remained so. The discharge became markedly less after three exposures, but continued for two weeks to discharge a small quantity the next morning after the exposure.

She has had irregular treatment since September, 1902. There has never been any reaction except the pigmentation.

During the whole period of the treatment, the family, yielding to the child's demands, have allowed her to ride a tricycle, using the good leg for propulsion, walk with and without crutches and numerous other things detrimental to her recovery.

The result here is a comparatively sound joint, with only one-half inch of shortening; the foot which was everted to nearly a right angle is carried normal.

The improvement in nutrition as evidenced by weight, color, growth and condition of hair, is as well marked.





## Editorial.

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The paper by Dr. J. Mount Bleyer is interesting and his views regarding the etiology of X-ray burns are original. No one can take exception to his report of the investigation by pathologists in the etiology of heat-burns. We must, however, dissent from his views as to the causation of the X-ray burn. We are not prepared to state that dust particles or germs floating in the air cannot be repelled from the surface of an X-ray tube, because the walls of this tube are electro-statically charged, and light objects can be repelled from a charged body; but it does not seem reasonable to hold that a radiation could produce such a motion. All scientists are agreed that the X-ray is a radiation of some kind, that is, a kind of wave motion.

But we object to this conclusion not only from the theoretic standpoint, but also on the experimental standpoint.

There can be no question that without the use of any antiseptic agent or dressing such as is recommended by Dr. Bleyer, a very considerable number of ulcerated epitheliomas, eczemas, lupus, acne, and all forms of inflammatory conditions have been healed, showing that the X-ray has acted as an antiseptic agent, destroying the pus cocci which were undoubtedly present as well as inhibiting their growth, instead of aggravating the infection by driving the bacteria into the lymph stream.

The paper, however, is one that should be carefully read. The success of the method in Dr. Bleyer's hands is very gratifying.



MINUTES OF THE REGULAR MEETING OF THE  
CHICAGO ELECTRO-MEDICAL SOCIETY.

Dr. Burdick in the chair.

Minutes of the February meeting read and approved.

Report of Dr. Burdick concerning the status of the legal proceedings regarding the right of the other society to use our name.

The case was heard on the affidavits presented by both sides. It had been agreed by both sides that the decision of the judge should be final. The judge decided that the incorporated society had the right to the name. The decision was accepted in bad grace by Dr. Pratt's Electro-Medical Society, and he has threatened to appeal to some other judge or appeal to the Appellate Court. In the meantime we can only await developments.

Paper read by Dr. R. H. Street, entitled "The X-Ray; Its Use and Abuse." Paper was discussed by Drs. Coleman, Neiswanger, Boomer, Burdick and Dr. J. A. Weitz, of Montpelier, Ohio.

Paper by Dr. E. H. Grubbe on "Electricity in Gynecology." Paper discussed by Drs. Neiswanger and Burdick.

A new therapeutic lamp was then exhibited by Mr. Anton Frank. Dr. Burdick states that he was giving the lamp a trial on some of his cases.

Society then adjourned.

March 31, 1903.

C. H. TREADWELL,  
*Secretary.*



NOTICE OF THE NEXT MEETING OF THE  
CHICAGO ELECTRO-MEDICAL SOCIETY.

The next meeting of the Chicago Electro-Medical Society will take place April 28, 1903, at 301 Schiller Bldg., 8 P. M.

Dr. G. G. Burdick will read a paper entitled: "Electrolysis in the Treatment of Stricture of Male Urethra."

## THE X-RAY—ITS USE AND ABUSE. \*

RICHARD H. STREET, M. D., CHICAGO.

Believing in the great value of the X-ray as a diagnostic and therapeutic agent, I feel that I may be permitted to express my views upon this subject which has been so much used, abused and discussed, not only by the medical fraternity, but by the public at large through the medium of the daily press.

Its use as a diagnostic agent I will not take up this evening, as all are more or less familiar with the great work that has been done in that respect.

The therapeutic facts have been brought to your notice by such writers, teachers and workers as Pusey, Burdick and Grubbe, of our city, and many others. I will take only the time to sum them up as they appear to me.

1. The X-ray is the most remarkable diagnostic and therapeutic agent of the age.

2. Its greatest value is in the treatment of superficial diseases, such as lupus and epithelioma of the surface, and in all post-operative cases of cancer and tubercular conditions to prevent recurrence.

3. It is of great value in all inoperable cases of cancerous growths to relieve pain and prolong life, making the last days of the condemned one comparatively comfortable.

Many symptomatic cures have been effected in this last named class of cases.

5. Hemorrhages and discharges are markedly lessened under the application of the X-ray, and in many cases cease entirely.

6. This form of treatment has been found invaluable in many cases of skin disease.

One very important fact, which seems to be overlooked by the majority of the medical profession, as well as the laity, is that it takes more than a medical diploma and an X-ray apparatus to make an expert radio-therapist.

In discussing the abuses and blunders, we must go back about two years and look over the literature upon this subject.

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\*Paper read before the Chicago Electro-Medical Society, March 31st, 1903.

It was difficult to find a medical journal, or, in fact, newspaper, that had nothing to say upon the subject of the therapeutic use of the X-ray; some to praise, but many to condemn. An over-enthusiastic few saw in this wonderful discovery the long-looked for "fountain of youth"—panacea for all ills. Their writings made the reader wonder what was to become of the surgeon and family physician. This, of course, had a tendency to make the skeptical more bitter in their criticism.

The daily papers were filled with wonderful cures and new discoveries. It seemed that there was nothing that would not yield to this all-powerful light.

One physician went so far as to state, in a daily paper, that he could remove or restore the hair at will. I quote an excerpt from the article, as follows:

"The day when bald heads will no longer monopolize the front row at the theater, when shining pates will no longer take up half the funny pictures, and when all hair-growing nostrums will beg for buyers, is near at hand, for the X-ray has been found to be a cure for baldness."

To my mind all this early outburst of enthusiasm upon a subject not old enough to leave the nursery, was undignified and should have been discouraged by those who were hard at work in their laboratories making scientific investigations and experiments.

Nevertheless, it led many of the general practitioners to purchase X-ray apparatus. The X-ray and electro-therapeutic laboratories of this city received daily visits from physicians who wished to learn the use of the X-ray, and who were willing to give an hour or two to the study of the mysteries that lurked in the coil and tube. A few words from the radio-therapeutist, who had given years to the study, as to what kind of a current to use, how to connect the tube, and which switch to turn first, seemed to be sufficient. He was thanked for his instructions, and with this thanks was born a new radio-therapeutist fully equipped for the battle. The above may sound fictional, but I feel sure that many other workers have had similar experiences.

Is it any wonder that these illy-equipped experts (?) should make mistakes and by their mistakes bring the X-ray, not

themselves, into disrepute. I am at a loss to understand why, in this enlightened day and age, the mistakes and blunders of inexperienced workers should reflect discredit upon a scientific subject. But the fact remains that all burns and deaths which have been attributed to X-ray exposures are blamed upon the Ray, and not upon the man behind the tube. This does not apply to other branches of medical science. Surgery and medicine are not held accountable for the blunders due to ignorance or inexperience of the surgeon and physician.

We realize more and more every day that the medical profession at large should be educated along this line; but the question arises how is this education to be accomplished when a large majority of the X-ray workers know so little about the subject, and have spent so short a time in acquiring that little.

The following I consider a very good illustrative point. Very recently, an address, illustrated by photographs, was given in one of our leading medical societies upon a wonderful new discovery in X-ray photography. In passing, I wish to state that the subject had been "weighed in the balance and found wanting" in practicability. The speaker went on to state that he could say very little regarding technic, as his knowledge of the X-ray had been acquired in five weeks. Previous to that time he had never seen an X-ray apparatus in operation. He remarked that he had read *all* the literature upon the subject of X-ray photography and could find no mention of his process ever having been used.

I think you will agree with me that this one illustration shows us the need of educating the profession in the value of the X-ray in surgery and medicine. Those operators who have failed to make a proper and complete study of the X-ray constantly run the risk of appearing in the role of defendants in the courts, as the following case reported from a neighboring city illustrates:

"He (the plaintiff) claims that in March of last year, he swallowed, or inhaled, a small piece of gold, which lodged in his trachea, and that he visited the defendants for treatment. He says that five times in succession, at varying intervals, the doctors subjected his exposed back to what is known as the X-rays. He then alleges they informed him that they

were not experts in the use of the X-ray machine. Thereupon he visited an expert, who exposed him for the sixth time to the exposure from the X-ray. Plaintiff claims that he suffered through the use of the X-rays by the defendants, severe shocks, and received injuries externally and internally. The skin sloughed from his back, and there was considerable destruction of nerves and tissues."

How much better would it have been had our colleagues admitted their ignorance of the subject before they demonstrated it.

I think a few more cases of this sort will teach the medical profession that this branch of medicine belongs to the specialist who has made it the subject of much work and study.

I fear that commercialism has done much to retard the scientific growth of the X-ray. The clever salesman spares no trouble in illustrating and explaining the workings of his apparatus, and he can convince the would-be purchaser with its simplicity of operation and of the great returns sure to accrue from the capital invested. One ingenious firm went so far as to offer with each apparatus sold, as a premium, a free course in a school of electro-therapeutics. The value of such a course is most appreciated by those who are on the lookout for something for nothing—thus valueless.

The most shameful abuse of all is practiced by the "quack" advertising doctor (?). The newspapers are full of invitations to suffering humanity to avail themselves of "famous free X-ray examinations." These unscrupulous money-makers promise the most absurd results, claiming to be able to diagnose any and all troubles to which the human flesh is heir by their wonderful "new" methods. The ignorant populace flock to their well-equipped offices. The X-ray examination is free, and is worth just what it costs; but they pay dearly for "bi-chemic" treatments, electric belts, etc.

This evil should be stamped out, and it must be done by the medical profession. For they, as well as the ignorant public, are the sufferers.

This can only be accomplished by the honest X-ray specialist, who should educate the general practitioner in the value and use of the X-ray, and he in his turn should impress

those of the laity with whom he comes in contact with the position that the X-ray occupies in the science of medicine.

126 State street.

#### DISCUSSION.

Dr. Coleman said, that while all the paper stated was true, he wished the doctor had given more attention to educating the general worker in the correct use of the X-ray. A special field of investigation in which he had been working was the treatment of lesions involving the eye and the surrounding structures. He began the treatment of these cases with great trepidation, because he did not know the tolerance of the eye to the X-ray. One of his cases had been diagnosed as an epithelioma of the lid. He told the patient that he did not know whether the X-ray would destroy the eye, but advised her to take the risk because the lesion would undoubtedly proceed to fatal termination. He therefore referred her for treatment to Dr. Neiswanger, who treated her two or three times a week for a considerable length of time. He was surprised to note that the vision of the patient did not deteriorate. He thought that she had received possibly one hundred treatments, when he finally noticed an ulcer on the cornea, and thought that this was an extension of the lesion. He has, however, since questioned that, because the skin surrounding the eye received quite a severe dermatitis, and now thinks that the ulcer might have been due to the radiation.

He is also trying the X-ray in a series of cases of trachoma. Only one of the cases has he completed: After eighteen or twenty exposures the lids were perfectly smooth.

Dr. Coleman called attention to a lack of observation, which he believed was almost inevitable among those beginning the use of the X-ray, namely, overlooking the first signs of dermatitis. In the first case he treated, the patient was the first to notice the redness of the lids. Afterwards the ulcers developed on the cornea and lid. The case has now recovered. He felt this experience was worthy of mention, because he had not been able to find any literature on the direct exposure of the eye to the X-ray. In fact, a case of optic atrophy, which had been referred to Dr. Pusey for treatment, was radiated through the temple and not direct.

Dr. Neiswanger said that the patient referred to him by Dr. Coleman had not really received more than fifty or sixty treatments and the vision had improved a little under the treatments, a fact which Dr. Coleman had mentioned early in the treatment. The eye withstood the ray better than the surrounding tissues. The part of the lesion affecting the skin had reacted favorably to the ray and, in fact, seemed entirely healed, but afterwards it extended to the deeper tissues of the orbit. This brought to mind a remark which he had often made to his classes that an epithelioma of the mucous surface was harder to cure than one involving only the skin. The lesion is now rapidly healing up. The depth of the ulcer lessened. There has been some disintegration of the surrounding tissues and he believes that the malignancy of the growth has been destroyed, the ulcer simply being due to the dermatitis. An epithelioma involving a corner of the mouth healed readily in about one month after about twenty applications. Only a white scar remained, and the patient went home. Subsequently, however, the submaxillary gland on the same side began to enlarge and the patient reported for treatment. The lesion is carcinoma of great malignity, as evinced by the rapid invasion of new tissues and the extremely fetid discharge.

Dr. Neiswanger believes that not enough surface was radiated in the first course of treatment, and that much of the surrounding tissues should have been included in the area of treatment; it would then have been impossible for the lymph channels to have carried the infection through the glands.

Another peculiar thing with respect to this case he wanted to mention. He constructed a mask by cementing tin foil upon a false face, using two or more coats of the foil. The cement substance was white lead, which adheres very well; moreover, this is opaque to the ray, as evinced by the black shadow which it will leave on the fluoroscope. This mask projected in front of the face something like a sunbonnet. Vigorous treatments were instituted upon the submaxillary region, producing a considerable dermatitis, but an unexpected



feature was, that the burn spread over the entire side of the face, the upper lid of the eye developing a cellulitis.

A case of tubercular glands of the neck presented similar phenomena. The lead foil was of four layers in thickness and was lapped over both sides of the head like a sunbonnet. In spite of this precaution, the entire front of the face was reddened. From these facts it looked as though the X-ray had gone around the corner. He would like some one, who had had similar experiences, to explain the phenomena.

Dr. Coleman rose to add: In the trachoma case described as cured, an ulcer of the cornea occurred near the close of the treatment. It is a question whether this was due to the radiations or was it due to the trachoma, a frequent result.

He had treated a girl of 16, suffering with opaque cornea for about two years. The vision had stood still 6 months. After 15 to 20 treatments the vision had doubled. He did not protect the surrounding tissues and about an inch of her pompadour and here eyebrows were depilated. He was much relieved, however, to find that they subsequently returned.

Dr. Burdick said he had noticed, in quite a number of his early cases, the burning along the edge of the mask and he had laid this to the small electric sparks discharged upon the skin from the lead foil used as a protection, and which becomes charged electro-statically. It may be overcome by placing the mask in contact with the skin.

Dr. Neiswanger replied that the dermatitis produced by fine static sparks looked very different from this. The skin got brown and peeled off in places, typical of an X-ray dermatitis. The entire nose and front of the face was affected.

Dr. J. A. Weitz, Montpelier, Ohio, rose to ask concerning the metastases in the submaxillary glands. He questioned whether the infection would not be carried more rapidly after an epithelioma softens up under severe treatment, than if a milder form of treatment were given.

Dr. Burdick said that the extension of the lesion to neighboring glands ought not to occur after the case is progressing towards recovery. He believed that such cases were due to limiting the area of treatment. It was his practice to radiate almost the entire body, except when he wished to produce

a breaking down over a small area. In such cases he would give a series of four or five exposures, crowding a large current through the primary of the coil and therefore getting an intense ray. The surrounding tissues are protected by a shield placed in direct contact with the body. By this he would not obtain any induction effects, and the rays could not penetrate under the shield. The fluoroscope is not a correct criterion to determine the kind of ray you wish. Photo-chemical rays and the X-ray, used radio-therapeutically, are the same thing. The illumination of the screen depends upon the speed with which the corpuscles travel within the tube, and the speed of the corpuscles depends upon the electro-motive force of the apparatus alone. More amperage may be sent through the tube at a given electro-motive force without increasing the illumination, but it does increase the richness of the photo-chemical light and just in proportion as the amperage is increased at a given electro-motive force, just in the same ratio do we get greater reduction power from the X-ray.

If you take a low tube with a resistance less than a quarter inch in the air, one which does not give any X-ray when in series, you can verify the above statement. The penetrative power of the ray depends upon the electro-motive force of the coil. The speed of the corpuscles in the cathode ray depends upon this electro-motive force. The number of corpuscles in the discharge depends upon the magnitude of the current going through the tube.

The static machine sends out ether waves into the space surrounding it and these waves degenerate in the heat. The coil does not send out these waves in the same proportion for the electro-static tension is not so high.

A very curious fact he had noticed respecting the indirect effects of the X-ray upon the eye. Up to about a year ago Dr. Marsh had to wear glasses for myopia. He then began to experiment with the X-ray. His eyebrows came off and have not completely returned, but he now can dispense with his spectacles.

Dr. Burdick protects simply the eyebrows, because he has found that the eye withstands the X-ray. The early sign of X-ray burns is the smarting and stinging sensation followed

by an intolerable itching. This is a sign for you to let up on the treatment, unless a pronounced dermatitis is desired. Since the paper deals with the uses and abuses of the ray, it does not require any elaborate discussion. We are all familiar with its abuses.

The X-ray is on trial before the medical profession only. Among X-ray therapists it is no longer on trial, because every expert knows pretty well its limitation. He could sign a contract of "No cure, no pay," and would not lose a case where such a contract was made. He could say, that the ray bids fair to cause a marked improvement in other cases where a cure could not be expected. The use of the X-ray in all the difficult work must be confined to experts, men who give all their time and thought to the work, and do not make it a secondary part of their business. While the general practitioner is out on a confinement case, patients are waiting, and the results cannot be most favorable.

Among the abuses of the X-ray may be mentioned a case which illustrated the half-hearted way some men carry on X-ray treatment.

A prominent surgeon, who uses a static machine, treated a cancer for four months, charging five dollars a treatment. Now most of the experts do not use static machines in the treatment of cancer. The case did not improve and the surgeon assured the patient that all hope was lost. One of Dr. Burdick's friends persuaded the patient to come to him for treatment. In twenty-eight days the cancer was entirely healed, and there is no evidence of a malignant growth. In some of the tissue taken for microscopic examination, there were no epitheloid cells, but it was normal tissue with a predominance of connected tissue, such as is found in all cases treated by the X-ray. Of course, we cannot be sure that there may not be a recurrence, but in that case, the treatment could be instituted at the first sign of a recurrence. One singular fact in connection with this case was the attitude of the surgeon alluded to. Whenever meeting the patient on the street he would inform the man that he would regret taking the treatment and did all he could to discourage him.

Another case, cancer of the breast, was informed by one of

the surgeons that the breast could not be successfully treated by the X-ray; but after three months' treatment the woman was cured. The surgeon seemed to be angry because of a success of the treatment.

Every operator has learned valuable points from his failures. We can do in weeks now what formerly required months to accomplish in our early experience. For instance, we did not use any adjuvants for the X-ray treatment, but we now use all possible assistants to sustain the vitality of the patient and to aid in elimination of waste products.

Dr. Street, in closing, said that he wished to agree with Dr. Burdick regarding the adverse position taken by the surgeon in regard to the therapeutic use of the X-ray. About two years ago two of Chicago's most prominent surgeons were interviewed upon the subject and both condemned it in the most severe terms, calling it the work of quacks. To-day these same surgeons are using the X-ray in their practice and praising it in glowing terms as "The greatest therapeutic agent of the day," simply showing that ignorance of the subject made them blind and that stubbornness prevented their acquiring knowledge.



ORIGINAL RESEARCH ON PARAFFINE AND ANTI-SEPTIC DRESSINGS AS A SPECIFIC AGENT AGAINST THE SO-CALLED "X-RAY" BURNS, AND MY THEORY OF THEIR CAUSES; WITH A REPORT ON TWENTY CASES OF LARYNGEAL TUBERCULOSIS TREATED BY THE X-RAYS, AND WITH TWO CASES OF EPITHELIOMA OF LIPS AND TONGUE—GENERAL REMARKS.\*

BY C. J. MOUNT BLEYER, M. D., F.R.A.M.S., LL.D., OF NEW YORK.

Discoveries of the properties of the X-rays go on apace, and the scientific world is watching with the closest interest,

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\*For the XIV. International Congress on Medicine. Madrid, April 23-30, 1903.

the different aspects of the experiments being made; to determine the effects of these rays upon human body.

Since the discovery and application of the X-rays in medico-surgical work, reports have spread among the profession and lay-public, that a grave danger accompanies their use, owing to the fact that they produce the so-called virulent burns by exposure to them.

Records now on file show many cases differing in degree; and some that have proved fatal and some proved most damaging to parts from a lingering exposure to them. Even, there is recorded a recent murder trial in this state, where the question arose whether or not the physician who made this X-ray exposure upon the patient had not committed an act of negligence which resulted in death. Let me say at the beginning of my remarks, and this I gather from experimental work, that in their future application all timidity can be allayed. I conclude, that if certain precautions are taken when applying these rays, and the proper apparatus used, no burning is possible. I speak now from experience in the daily employment of the rays to the chest-wall for diagnostic purposes and as an aid in discovering early signs of tubercular and other allied diseases, and also the employment of these rays as a therapeutic agent whose merits are already known.

This investigation gives me the right to an opinion, and I lay it before you to show how we all have fallen into that false position of calling these phenomena burns produced by these X-rays, when it is nothing more or less than secondary inoculation.

Now that we know how to remedy the dangers connected with their use and how best to avoid a recurrence of the same, the physician or whosoever applies the rays is to take the blame, if the proper precautions, as in all surgical operations, be not observed. Later, I shall refer to all these facts.

Let me eliminate from your minds that an X-ray application, or the use in its radiography or in their therapeutic use is a dangerous procedure, either on a long or short exposure. If this force is applied and handled by skillful hands and suitable mechanism, there is absolutely no fear of producing this phenomena of inoculation, known fallaciously as X-ray burns.

This inoculation, according to my observation of a series of experiments, is due to several physical effects produced by the generation of these rays and the general conditions present. It is a recognized fact that the use of the Ruhmkorff coil in connection with the generation of these rays is an apparatus which gives an exceedingly high electro-motive force and amperage; and therefore, when such high discharges are exhibited, they produce certain physical conditions in the atmosphere surrounding the patient or person exposed to these rays.

discharge is leveled against the subject, carrying with it from

To sum up these physical facts, we find that this high the surrounding septic atmosphere, certain particles floating therein. Also the clothing and skin of the patient are surcharged at all times with bacteria and foreign material, which are at all times present, sometimes setting up an infection; at other times an inflammatory condition is produced by this septic matter being force-driven under the layer of the skin that is exposed to this phenomena. By the use of the static machine these conditions happen also, but in a more modified way; nevertheless, this secondary infection also takes place where the X-rays are applied, no matter how generated.

This inflammatory or inoculated condition, which I have discovered in my crucial experiments to be the results of all these facts, can now be avoided without any difficulty on the part of the operator by the adoption of a few rules gleaned from my experiments which I shall give in the summing up of my remarks.

I now bring before your notice a few important facts, which are also corroborative and apply directly to my own investigation. These facts cannot but be appreciated at this moment as they come also from several later observers who have studied the question of burns due to fire and hot water and the causes of death therefrom. We already know that many deaths are due to burns produced by other causes than the X-rays. To account for deaths which occurred among persons suffering from other burns, even where the injuries received seemed to produce the fatal results, has been a puzzle for the scientist.

Persons who have escaped with their lives from a fire,

whether very severely burned or otherwise, suffer peculiar pain, which is followed by a peculiar torpor and dizziness, and not infrequently, by delirium and convulsions. The pulse becomes weak, the breathing irregular, the temperature lower, and there almost always follows vomiting and other symptoms of poisoning terminating within twenty-four to twenty-eight hours in death.

Although these symptoms have received the attention of a number of scientists, their views of the actual cause of death are widely diverse. The first guesses, though ingenious, were very far from the truth. A German, F. Falk, arrived at the conclusion that persons suffering from burns died of colds caused by the abnormal amount of heat given off through the burned portions.

Prof. Poufete on the other hand, believed the cause to be the destruction by heat of a great number of blood corpuscles, thereby inducing a disturbance of the circulation. Addakoff, a Russian physician, stated on his view, gained from clinical observation, that the result of burns upon the system bore a resemblance to the effect produced by certain poisons, particularly those generated in the body by the failure to draw off secretions. Lustgarten and Kijarictson came still nearer to the truth. The former compared the results of a burning with that of ptomaine poisoning and the latter declared that under some influence or other, probably that of a ferment, or of bacteria, a poisonous matter developed in the blood of burnt persons. He actually found in the blood of such persons a poison (ptomaine) that is not present in normal bodies. It is a formless matter with a sharp, disagreeable odor; if injected into dogs or rabbits it produces all the symptoms caused by burning. The belief of Lustgarten that bacteria causing injuries which settled in the wounds were the generators of the poison was shown by the experiments of Agello and Parascandolo to be unfounded. Both these men were able to take from any part of the body of a burnt animal a poison the injection of ten grams of which into a dog weighing twenty pounds produced instant death. The strongest poison was obtained from the burnt flesh, a lesser was in burnt entrails and the weakest of all came from the blood. From this may be deducted with certainty that the ptomaine

is not solely in the blood, but in the whole of the burnt portions and is thence carried into the system. Burned persons poison themselves, so to speak. The poison may be regarded as the product under the influence of high temperature of the albumen and the direct impregnation of bacterial poisons from without. It has been found possible, however, to prevent the poison from spreading by removing the burned portion before the ptomaine had entered the circulation. It is known from the experiments of Agello and Parascandolo with animals that all recovered, without having suffered from the symptoms incidental to burns when the amputation of the burned parts occurred immediately after the burns were received. Where the amputation was delayed for twenty-four hours, they all succumbed, except in instances where large quantities of blood were removed by bleeding, the blood drawn off being replaced, however, by a transfusion of the blood. By the bleeding, a large quantity of the poison was removed. The blood artificially supplied so strengthened the animal that the further separation of the poison from the blood by means of the kidneys was facilitated.

I lay much stress upon this important point due to the X-Ray phenomena; that the X-Ray burn always appears many days after the application of this force or light to any part of the body and does not give an early manifestation in minutes or hours thereafter, but days elapse. Even after eighteen days these X-Ray burns may show themselves. They begin slowly with a painful dermatitis and symptoms resembling burns from heat and scales.

It is therefore from the very outset that the difference of the clinical conditions is apparent. How should we avoid this dangerous condition in the application of the X-Rays?

To sum up the whole matter in a few words, let me add the following, viz.: all parts to be radiographed, treated or examined, or whenever these rays are to be employed should have all clothing removed therefrom and should be washed with an antiseptic solution and so prepared as though a surgical operation were to be performed. Also there should be a room prepared which is as free from infectious material as possible, or there should be one especially appointed for the purpose.



These are the first cardinal rules which must not be deviated from in order to avoid a dangerous inoculation of poisoning.

REMARKS ON PARAFFIN DRESSINGS FOR THE PREVENTION OF  
SO-CALLED BURNS.

Let us take into serious consideration this fact, that it is risky to use any screen, no matter of what class of material it is composed, that is not in direct contact with the part to be treated, radiographed or inspected by the rays. Screens, therefore, must be fitted to the closest possible position, leaving no interspace between the subject and the screen unless the protective paraffin, gauze or paper dressing envelops the entire surrounding parts.

I have found from experience that any interspace left unprotected between the patient and the screen exposes the patient to the secondary infection, which is produced by particles either on the part itself to be X-Rayed or floating in the air, etc. To prevent such a disaster at the very outset of the use of the X-Rays in all conditions, I plead for the strictest aseptic surroundings as well as perfect aseptic conditions of the subject. These precautions are more important in connection with operating the X-Rays. I find them even more important here and more risk is attached to the neglect of them than in the performance of a surgical operation without the antiseptic condition. No one can appreciate this position unless he has given some attention and study to the physical power of the X-Rays as a carrying medium for foreign material floating in the surrounding air, for particles attached to clothing and upon the surface of the skin or elsewhere are always present, where the X-Rays are to be applied.

The dressings used before the X-Rays are applied should be of such material as is absolutely impermeable to all dust particles, etc. I find that the ordinary surgical gauze, either soaked in paraffin or the ordinary wax solution, or the surgical gauze plain applied in several thicknesses of say one-half inch and then covered over with about thirty thicknesses of sheet wax paper or paraffin paper will be found a first class protector against these particles, thus making the X-Ray a filtered ray. But before all the procedures we must not forget under any consideration that the aseptic preparation of the

subject to be X-Rayed should receive detailed attention, otherwise the patient is exposed to the risk of the secondary inoculation, as I call the burns. Never under any consideration can the same dressings be used upon a patient the second time, or the used dressings upon any other subject, as they already contain contaminated material from the first exposure, which was forced through and is upon them, especially when treating parts in an ulcerative or diseased condition. These rules must be rigidly observed where this state exists; fresh dressing must be applied at each sitting. My method in such instances where ulcerative, etc., conditions are present is as follows: Aseptic washing of the part; covering at once with antiseptic gauze and paraffin covering before any exposure to the rays is made, this followed by a fresh dressing according to one's own experience in practice. I generally use sterilized pure glycerin or albaline with some antiseptic in solution as a secondary dressing where I find the skin irritable.

HOW SHOULD THE OPERATOR PROTECT HIMSELF FROM THE INJURIOUS EFFECTS OF THE X-RAYS?

Prevention is the first rule to be observed. Prepare your hands, face and head as you would in any operating room. The cardinal rule to be observed is that the head, hair, face and hands be thoroughly shampooed, and when ready for making the exposure the head should be covered by a protecting hood of linen, freshly lined, each time it is used, with gauze and paraffin paper or similar material. The face, which much be clean-shaven, after a thorough brushing with soap, receives a coating of vaselin, glycerin or like substances. This rule is also to be followed for patients placed under the rays when they are used in these regions. The hands need the most scrupulous care, the nails cut short and the brush used to cleanse them as clean as possible, as these are a great source of this secondary infection. Cover the hands and arms entirely with a solution of antiseptic glycerin or vaselin.

If these hints are followed you will find that no so-called X-Ray burns will occur, and this much-feared accident will cease to be a troublesome obstacle to the more general use of X-Ray therapeutics and Radiographing.

I must caution you that using any class of screen without the

superimposed dressings close to the patient is taking the greatest risk of secondary infection. As a double precaution additional metallic or composition screens may be used, but the formidable dressings are the first essential to the safe application of the X-Rays.

To show the success of this mode of prevention of X-Ray inoculation, I append my record of twenty cases of laryngeal tuberculosis which were treated by the X-Rays, in which my protective dressings were used throughout the treatment, besides the hundreds of other exposures without a single accident.

I cannot report one case where any injurious effects resulted during the entire treatment and attribute the same solely to this manner of prevention and the truth vested in my theory of the X-Ray burn being a secondary inoculation.

**"Report of twenty cases of Laryngeal Tuberculosis and two cases of Epithelioma of Lips and Tongue, Treated by the X-Rays and with General Treatment from the Laryngologist Point of View."**

We all know of the efficiency and virtues ascribed to the X-Rays since their discovery. It would be more than useless for me to recapitulate their phenomena and value. Let me simply make a report to you of the twenty cases which were treated by me, under these rays, and what the results were. There was no simpler remedy ever found for the treatment of this serious affliction than these same mysterious rays.

I began my work early in 1896 and up to date I am able to make this report:

The X-Ray in combination with general treatment, that is, currentage, application of lactic acid and the daily intratracheal injection of the ordinary albaline preparations, with fresh air, food and sunlight, will be found to compose the full armament for the successful treatment of these diseases. The X-Ray, as I find it, has simply a specific action upon the tubercular infiltration and its surrounding tissue, while the other remedies simply aid in the progress and rehabilitation of these tissues to a more normal state.

Of all these cases I have to report but two failures and

those, very advanced, were only taken on as a mere experiment. These two cases had already progressed to a stage where the surgeon's hands and skill were useless; also the complications that were present were of such a character that no treatment at our disposal would have been of any service in saving the life of the patient.

The other cases all made rapid recoveries in from seven to ten weeks' time.

The time occupied for each sitting is from 15 to 30 minutes; the rays are applied by means of a shield made of lead, fitted over the external part of the throat. An opening is cut in the lead shield, sufficiently large to allow the rays to pass directly over the seat of the disease. All the previously quoted precautions against burning must be strictly adhered to. Simple antiseptic dressings over the applied X-Ray area should always be kept on until the end of the treatment.

It is unnecessary to repeat the clinical history of each case or to tell you what has already been attempted and done in the various number of installed remedies for laryngeal tuberculosis or to go into the pathology of it. But I place plainly before your notice this fact, that in the X-Ray we have found a remedy which has proved itself a staunch friend.

Throughout the entire care of such cases we must not neglect the least hygienic principle. Feeding, one of the most important factors, must be carried out to the minutest details.

A nurse should be employed in every case and the orders left by the physician must not be deviated from one iota.

Regular and carefully selected food is a sheet anchor to success. The nurse must feed the patient every two hours, and if necessary the feeding tube must be resorted to.



## TWO CASES OF LIGHTNING STROKE.

The following report appeared in the Wisconsin Medical Recorder, contributed by M. C. Martin, M. D., of Hartwell, Neb.:

"Two men, several rods apart, were struck simultaneously at Paxton, Neb., several years ago. Fred Crook, section foreman, was struck on the head, making a star-shaped tear in his hat, singed the hair on back of head; about five minutes afterward found him unconscious and apparently lifeless on floor of hotel. I commenced artificial respiration, put some glonoin in his mouth, also gave him nuclein occasionally. His feet were placed in hot water and his legs rubbed by friends and neighbors. His breathing was not regularly established for about three hours. He did much groaning as he was coming to. He was taken up stairs in the hotel and kept several days, being watched carefully. Lager beer was the first thing he wanted and I let him have it. His pulse ran down to 50. He was kept on tonics till he recovered. He remembered nothing that occurred at the hotel. He went to work in about three weeks.

"The other case was a man going through Paxton. The electricity cut his collar and necktie off on the left side of neck, burned hairs off down his body, broke a truss off on left side, burned hairs off clear to left foot and left a sore place under his foot where it parted company with his body. While I was working on case No. 1 the other case was taken up stairs and watched. They said his pulse ran up to 140 per minute. He was badly scared and complained of pain as much on the right side as on the left side. He was found to have a pulse of 120; it staid at 120 for two or three days. He was given heart tonics for a few days; then he was sent back to Iowa.

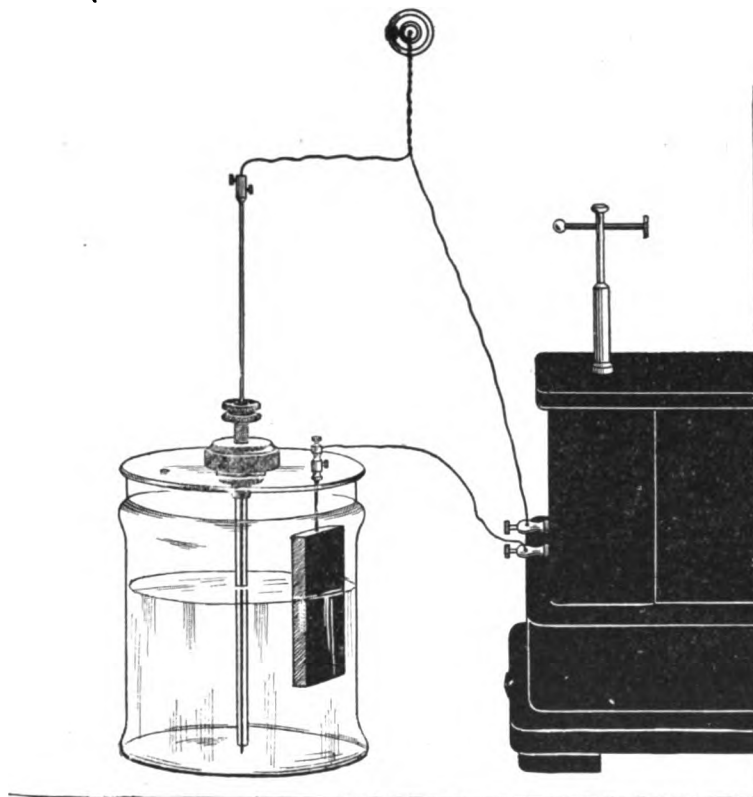
"It is safe to say that neither of these men will ever voluntarily act as lightning arresters again."



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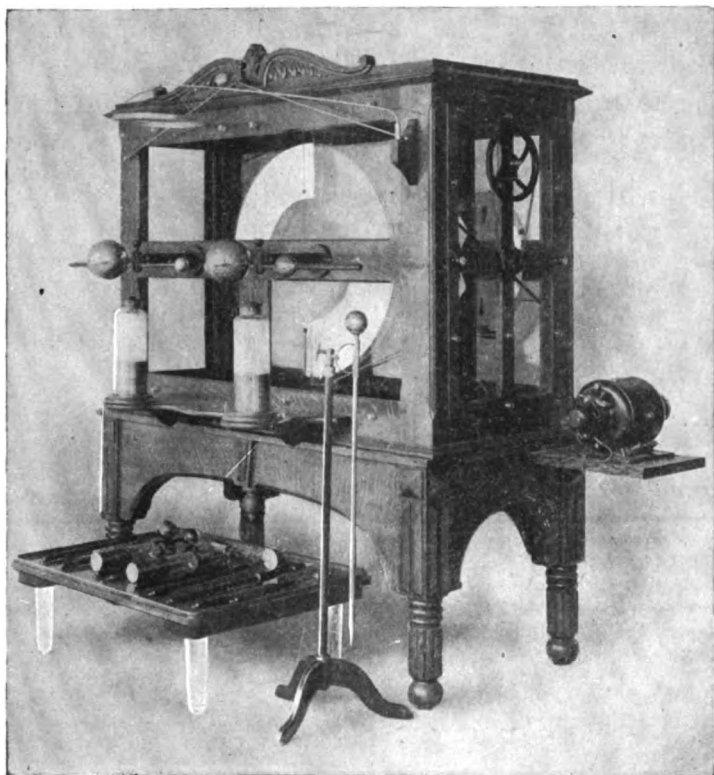
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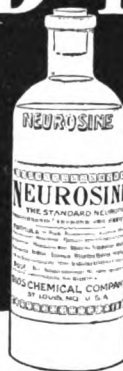
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# American Electro-Therapeutic and X-Ray Era

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## Original Contributions.

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### PSORIASIS TREATED WITH X-RAY.

By E. S. Ferris, M. D., Henry, Ill.

Mr. A. H., age 50, blonde, married, occupation farmer. Has had the disease as long as he can remember, that during last fifteen years it has been more marked, spreading steadily. Says "he has a brother similarly afflicted." At intervals he has undergone both local and constitutional treatment; only result of this an apparent lessening of the scales for short time. Occasionally, even while under treatment, there was diminished activity manifested by disappearance of scales and paling of red patches, but the papules never disappeared. October 1, 1902, he presented for treatment. I found the disease involved the skin covering the front from neck to navel, the back, the scalp, forehead, the knees and elbows; appearing as slightly elevated, round and reddened patches of various sizes, covered with an abundance of dry, white scales. These patches were so arranged, especially upon chest and back, as to produce patterns of striking appearance. See cut No. 1. The scales had shed in large quantities on the patient's clothing. At no time were the mucous membranes, or nails involved.

I prescribed Fowler's Sol. and Cascara Sag., and during the months of October and November gave him fifty treatments with "Brush discharges" with no apparent improvement. I then stopped medicinal treatment and Brush discharges, and during December gave sixteen X-ray sittings *to back only*.

To cover the entire surface of back at one sitting, three exposures of ten minutes each were given. Medium hard tube and medium light, four to six inches distance; skin unprotected by clothing or mask. The above treatments were given almost daily. Owing to the redness peculiar to this disease,



**Fig. 1.**

it was difficult to distinguish an X-ray erythema. On the day following the sixteenth sitting, I found the skin tender and of a dusky hue, later a more marked reaction. After ten days

all traces of the disease except slight redness had disappeared from part treated. Even this redness was gone in another week and strange to relate the lesion on the chest vanished at same time. This success encouraged me to apply the X-ray to all other parts involved, with same happy results. The



**Fig. 2.**

patient gained twenty-three pounds the last six months of treatment. At present time there is absolutely no trace of the former trouble, the skin is soft and smooth and of normal color.

GENERAL ELECTRO-THERAPEUTIC AND X-RAY  
CLINIC.

SERVICE OF PROF. E. H. GRUBBE, ASSISTED BY DRS. LAURA J.  
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*Paralysis.*—Walter W., age 12. When four years old this patient complained of severe headache. He went to sleep and slept for three days and three nights continuously. When he finally awoke he could not use the right leg. Various treatments have been resorted to, but no marked benefit has been derived. On making the test for the "reaction for degeneration" it was found that the functions of all muscles would react under the Faradic current, although it was necessary to use rather an abnormal quantity of current to bring about contraction in some of the muscles.

He has had the slowly interrupted spasmodic Faradic current alternated with the galvanic current (8-10 milliampere) now for nearly two weeks, *i. e.*, five treatments in all, and he reports continued improvement.

We are not optimistic enough to say that this patient will get entirely well under this treatment, but from the improvement already obtained, we are indeed very hopeful.

*Cancerous Induration of Breast.*—Miss L. D., age 60. This patient comes to us for the treatment of an extensive induration of the left breast. Several years ago she noticed a swelling in this breast which she thinks was due to pressure against a board while taking care of an epileptic relative. From the beginning there has been pain. Two years ago she entered a cancer sanitarium in Boston, undertook and continued an injection treatment for seven months. She thinks she received no benefit from this treatment. Later she began systemic treatment consisting of the internal use of drugs. X-ray treatment was begun March 25 of this year. Twelve-minute exposures were made almost daily. March 28 she noticed some improvement.

April 2 her former physician examined her and reported quite a change for the better.

April 7, on examination, nodules in axillary region are much smaller.

April 14, pain nearly all gone and parts are more flexible; tissue seems to be getting soft.

April 23, her physician after examination reports decided lessening of induration and patient says she "feels fine."

April 30, X-ray dermatitis present, as shown by local redness, heat and itching, but patient says she feels very good. A mask of lead X-ray foil was placed over burned area and also over neck and face, to prevent the spread of dermatitis.

The reports of this patient are certainly encouraging enough to warrant our continuing this treatment.

*Epithelioma.*—Mrs. C. F. F., age 70. This patient was referred to us by her home physician for X-ray treatment of a recurrent epithelioma involving the lower left eyelid, nose and cheek. In many respects we have here a typical history.

In 1891 she noticed a nodule at the outer side of the lower left eyelid, which gradually increased in size, even though the patient was constantly under treatment of some kind or other, until four years ago, when it became an open ulcer about the size of a silver dollar. She was operated upon and the wound healed nicely and remained closed until nearly two years ago, when it broke out again and spread rapidly, involving the whole of the left cheek and the nose. In August, 1902, she began X-ray treatments with her physician and in about two months the lesion had entirely healed. She considered herself entirely well.

Last winter she was unfortunate enough to have a severe attack of "grip" and swelling and redness developed in the cheek and she came to us for X-ray treatment.

She has received several treatments and each time she returns with a good report. You can readily see that we have very little to treat at present, and we may say that for the present at least she is symptomatically well.

*Tubercular Glands.*—Mrs. M. H., age 37. Puberty at 12 years; regular for two years; came to America from Germany and menses ceased for one year. Always irregular after that until married, 12 years ago, when she became quite regular, missing only occasionally. She thinks she was pregnant once and had a miscarriage. Family history, mother living and well; father died three years ago of cancer of the stomach.



One year ago last January she noticed an enlargement of the glands of the neck on the left side. On July 5th, Dr. Rawson operated for this condition. On January 16, 1903, Dr. Kahlke performed a second operation on the same side. At this time the glands on the right side were also enlarging, but could not be removed. She has a regular elevation of temperature and there is no doubt about the diagnosis. Referred to our clinic for X-ray treatment April 23. Treatment consists of the use of a low vacuum tube and direct exposure of the glands of both sides for ten minutes every other day.

This patient has not been under this treatment long enough to allow us to form any opinion of the value of the treatment, but we have had several of these cases in whom marked beneficial results have been obtained, and since operation of these glands has proven unsuccessful, of course we will try anything which offers a ray of hope.

*Anterior Poliomyelitis.*—Edith G., age 3. Referred from Dr. Cobb's Clinic. In November, 1902, this patient had prolonged fever with paroxysmal contractions of the limbs. When the fever and other acute symptoms subsided it was noticed that paralysis of the right leg had developed. In the course of a few days, however, the patient gradually began to walk again. Still, motion was decidedly impaired and atrophy of some of the muscles was noticed. After testing the muscles and nerves by means of electric currents we decided to alternate a weak galvanic current given for ten minutes with a slowly interrupted Faradic current. She has received treatment now since February 26. The mother reports that the child lifts the foot higher than before and also that the child has more confidence and is able to walk about unaided. The leg looks more plump and the muscles feel firmer. Continuation of this treatment, I am confident, will bring about a favorable outcome.

*Tuberculosis of the Skin.*—Mrs. C. F. T., age 65. Referred by Dr. Strawn. General health has been poor for a number of years. Fifteen years ago was told she had pulmonary tuberculosis; went west and seemed to recover. Three years ago had pneumonia followed by the formation of an abscess in the

right lung. After this subsided numerous abscesses developed in different parts of the body and especially in the axillary regions and about the shoulders. Constantly troubled with pleuritic attacks. Nine months ago an ulcer appeared on the calf of the right leg. This refused to heal in spite of care and the best of local treatment. Five months later a gluteal gland became enlarged. This finally suppurated and to improve drainage was lanced, but it refused to heal. Dr. Collins saw the case at this time and pronounced it tubercular ulcer and she was referred to us for X-ray treatment. She has received quite a number of treatments and on examination we find the leg ulcer entirely healed. The gluteal ulcer, however, is not yet well. This part of course is exposed to irritation continually. Every time the patient walks or moves the parts are active and therefore we expect to have more difficulty in healing this than is usual. The patient has just had the edges of the ulcer trimmed and the parts are very sensitive, so we will not treat her to-day.

*Malignant Abdominal Growth.*—Mrs. C. B., age 56. This patient was sent to us by Dr. Bailey, who considered the case inoperable and recommended X-ray treatment not as a curative agent, but simply as a palliative measure. For some time she has had an uncomfortable feeling in the abdomen which is relieved by flexing the thighs on body. Feels exhausted and cold and even in warm weather she has to resort to hot water bags to keep warm. Nearly two years ago she had an attack of severe pain in the right hypochondriac region. This pain was almost constant and morphine was resorted to. Following this "neuralgic" pains developed in the epigastric region.

Physical examination revealed a hard indurated mass in the epigastric region extending downward to umbilical line and on the right side to the duodenal line. Glandular involvement.

She was placed under X-ray treatment November 11 and has taken the treatment at intervals of from one to two weeks at a time. The result is simply remarkable. She is very intelligent concerning her condition and will answer any questions you may care to ask. I might add that the tumor is decreasing in size constantly and that the patient is gaining strength and flesh at a rapid rate.

*Hemorrhoids.*—Mrs. E. C., age 57. Referred from Gynecological Clinic. The particular condition for which the patient seeks relief is that of bleeding hemorrhoids. In addition to this trouble she was a uterine laceration and endometritis. The treatment consists of the use of the positive galvanic current 10 milliamperes for 10 minutes every other day. An electrode composed of copper which is decomposed when attached to the positive pole is inserted into the rectum and allowed to remain during the seance. She has had only two treatments and her report is extremely gratifying.

*Lupus Vulgaris.*—Mrs. C. S., age 69. Referred by Dr. A. N. Fuller. About seven years ago this lady noticed a small nodular growth on the lower right eyelid. This itched and burned and gradually increased in size until three years ago the whole of the right eye and cheek and also the entire nose became involved.

X-ray treatment began April 2. A low vacuum tube was used for eight minutes every other day.

April 4.—Reports itching nearly all gone.

April 7.—Quite comfortable.

April 14.—Feels much encouraged and says she thinks she will finally get well. No itching but crusts are dropping off and wound is discharging profusely.

April 18.—About one-third of the original diseased area free from crusts and new skin forming.

April 25.—One-half of original diseased area free from crusts and covered with healthy skin. No discharge. Patient says she can see to read. Before undertaking this treatment she could barely see a powerful light placed before the affected eye.

In this case there is no doubt about the ultimate outcome of the treatment. She will get well. There is also no doubt but what the X-ray is the specific remedy in the treatment of lupus of all forms.

*Paralysis-Anterior Poliomyelitis.*—Agnes R., age 19. When 19 months old had enterocolitis with brain fever. After acute symptoms subsided, right arm was found paralyzed. As she grew, some slight improvement was made, but the extensors of the hand have always remained practically useless. Gal-

vanism and Faradism have been alternated in the treatment of this case. Much the same procedure is applied as in a previous case of paralysis. She reports decided improvement. Arm is much stronger. She can close the hand over a dumb-bell weighing  $1\frac{1}{2}$  pounds and lift it above her head for five or six minutes at a time and repeat this every two hours. The improvement is very gratifying to her, as she has frequently been told by physicians that there was no hope for her.

*Neurasthenia.*—Mrs. R., age 25. Principal complaint constant headache (top and forehead) and pain in the eyes. Extremes of temperature aggravate all symptoms. Eyes pain constantly unless she wears smoked glasses or covers them with a handkerchief. Feeling of fullness in bowels and frequent desire to defecate, but no stool without the use of cathartics. Local systematic examination reveals nothing abnormal. Treatment: Static head breeze and spinal breeze, 10 minutes of the former and 5 minutes of the latter. She has had only a few of these treatments, but reports improvement.

*Carcinoma.*—Mr. L. J. B., age 56. Referred by Dr. Chislett. This is a case of secondary carcinoma following sebaceous cyst formation in various parts of the body. Four years ago he had the middle finger of the left hand amputated for an exostosis. Two years ago sebaceous cysts appeared on various parts of the body. The first appeared on the head. This was removed surgically. Several others developed, among them one on the shoulder which gave considerable trouble and was operated upon. The last cyst to appear was one on the nose. Later these cysts developed on the forehead, the back of the neck, both axillæ and on buttocks.

The only one which at present is malignant is the cyst on the nose. X-ray treatment has been given nearly every other day since April 25, and the patient reports less pain and a diminution in size of the organ.

*Trachoma.*—Mrs. I. B., age 28. This lady was sent to us by Dr. Haseltine. She complained of inflammation, soreness and sticking together of the eyelids, photophobia and poor sight. History: No trouble before marriage. Her husband often had trouble with the urinary organs. Once he was confined to bed for several weeks; died six years ago of "rheumatic" trouble. She has three children and all developed

similar eye trouble about one week after born. Her own trouble dates back to her third month of married life, when her husband first manifested urinary symptoms and had a profuse discharge from penis. His eyes also were affected about this time.

We have given her galvanic electricity 4 to 10 mil. amp., using a wet sponge electrode. She will tell you that she is very much better, but due to the fact that her work will not allow her to come to us as regularly as she ought to, it will be some time before we can pronounce her well. If she were a private patient, daily treatments would be given.

*Cancer of the Rectum.*—Post operative.

Mrs. L. S., age 52. Referred by Dr. Watter of Joliet. About a year ago she complained of pain in the rectum and down the thighs. Gradually grew weaker until last January; an operation was performed and an artificial anus formed. She came to us for her first treatment April 2. She had been told that her case was a hopeless one, and so our treatment was only for the purpose of relieving her extreme and constant pain and if possible to give her the tonic influence of the X-ray. At first she had to have a constant attendant, but now she can walk about without any assistance. She feels decidedly stronger, her appetite has returned and her pain returns only occasionally.

*Anaemia.*—Mrs. E. C., age 32. This patient comes to us for the relief of sterility. Puberty at 15. Menstruation quite regular. Pain in pelvis accompanied by vertex headache for several days before the flow appears. These symptoms are relieved when flow is established. Flow usually quite profuse. Leucorrhea occasionally. She was married at 22. She thinks her husband is normal. She has had herpes and hives frequently. Her teeth are loose because gums recede. Local examination of pelvic organs reveals no abnormality excepting that parts are very anaemic. On close questioning, we become suspicious of the existence of specific trouble. Treatment: Static insulation and spinal spray for 15 minutes every other day. She is not to exert herself in any way and to get out of doors as often as the weather will permit. The tonic influence of the static current is well-known and in this class of cases de-

cided results may be obtained. Her few treatments have benefited her very much.

*Diabetes Mellitus.*—Mrs. M. S., age 52. Eleven years ago she complained of severe attack of pruritus of the vulva and itching in other parts of the body. Her physician after examining the urine attributed this attack to diabetes. She dieted for about a year, took his medicine and was pronounced cured. One year ago last February the pruritus and itching again appeared and urine again contained sugar. The old treatment and diet did not improve her condition, however, and hearing that static electricity had brought about good results in some cases resolved to try it. She has received the static insulation and spinal spray treatment quite regularly since February 1st.

She reports constant improvement. For a time (about two weeks) not a trace of sugar could be found in the urine. This week's report, however, is not so favorable. This may be accounted for perhaps because she was allowed fruits and she may have indulged too freely. Since the pathology of diabetes is not definitely settled, and since practically all our remedies for the treatment of this disease are used empirically, this electric treatment deserves a prominent space, for it has demonstrated in many instances that it does not have a favorable effect in this condition.

*High Frequency—High Potential Currents.*—One of the doctors asked to see the high frequency apparatus used. Due to the fact that all our patients to whom we give this current failed to come, we will have to demonstrate its action upon each other.

This current is extremely small in quantity, but it comes with great force, a force equal to from 50,000 to several hundred thousand volts. The electrodes are composed of glass vacuum tubes and are shaped in various forms to conform to the part of the body to which we wish to apply the current. The enormous pressure of this current may be realized when we connect one of these tubes to the coil. The tube begins to glow with a bluish light when the tube is low in vacuum. This current may be applied internally, as well as externally. Its principal effects are those of a sedative and it is therefore extensively used in the treatment of neuritis and rheumatic conditions. Due to the fact that, as the current passes through

the slight air space between the outer electrode surface and the tissues of the body, the air is decomposed and its elements separated into the nascent state, we have the local effect of ozone.

This allows us to use this form of electricity in the treatment of many skin diseases, prominent among which we might mention acne, eczema, psoriasis, simple lupus, ulcerated areas, etc.

The spectroscopic analysis of the rays which emanate from this tube also show a large quantity of ultra-violet rays, which are known to possess bactericidal properties.



## ELECTRICITY IN GYNECOLOGY.

BY F. ROBERT BOYD, A. M., M. D.

After using electricity for some twelve or fifteen years as a remedy in the treatment of disease, and being ever alert as to the best methods, efficiency of new and improved apparatus, etc., and while I find my enthusiasm gradually growing stronger for it as one of the chiefest of efficient agencies in therapeutics, yet I also find a growing spirit of conservatism for the remedy as a whole. My own tendency has been, as has that of most men, to allow my enthusiasm for some special modality to absorb too much attention and to detract from the best interests of some old, tried and true method, which has stood me well in hand for years. We find in the literature of the subject this same tendency. The Roentgen ray, for instance, was born

in 1895, and yet we find in text-books and electro-therapeutic journals everywhere a much more abundant literature on it than any other department of electro-therapeutics. This is not because the subject, as pertaining to the various uses of the currents by galvanism, Faradism, etc., has been exhausted, nor is it because the needs are any less great for a better technique and broader understanding of these most efficient modalities. The fact is, that, even with the attention of the profession generally bent in one direction, the use of these old methods has kept a lively pace with other departments of the science.

I think the wonderful developments of the X-ray have done much to awaken the whole profession to the truth of the existing power latent in electricity as a therapeutic agent; and in this indirect way have no doubt driven men back to first principles, and a much better knowledge of electricity in its physical characteristics has been the outcome. I think I am also safe in saying, that, could all men who to-day are attempting to use the X-ray, and who are enthusiastic over the results attained, both by reports from others and their own experience, have as full a knowledge of the physics of the currents and the clinical advantages to be derived by their use, outside the field of X-ray work, there would be a wave of enthusiasm never known since the days of Benjamin Franklin. Somehow the profession will cling to old prejudices in spite of every-day facts which are so abundant that they ought to clear the whole atmosphere and rescue forever from the hands of the quack and Charlatan an agent of such priceless worth. We all remember too well the attitude of the profession as a whole toward the X-ray. Only two to five years ago some of our most prominent men decried it and made all sorts of uncomplimentary remarks about its advocates, who to-day are themselves using it in practice and in some instances have become enthusiasts. This is largely due to the fact that the spectacular phenomena and the tangibility of the results attending the demonstration of the X-ray have been too palpably effective for the objections of this class of men. It is doubtful indeed to the clinician who has, during the past three or four years, treated disease by the galvanic, Faradic and Sinusoidal methods, and has kept pace with the improvements and discoveries growing out of the use of these



modes of current application, whether, after all the X-ray can show any greater achievements. I think my friends in the profession who know by experience what I mean by this statement, will corroborate it.

The object of this paper is not to detract in any degree from the popular sentiments toward the X-ray. There is no electro-therapist who is not glad to welcome for it all the honors it can win by a faithful and energetic profession. We claim it as a part of our armentaria and hail with delight every development it can make. But for the present I may be excused if I omit saying anything about a modest array of formidable cases coming under my care in which it has wrought some most gratifying results, and devote a little time to the consideration of other modalities. In glancing over my case-book I find a few cases which have been of great interest to me, and I can scarcely see how they can fail to be so to any physician who shall happen to read this article.

#### REPORT OF CASES.

Mrs. O., aged thirty; three children, youngest four years. Came to me in March, 1901, suffering from what she called piles, from which she had suffered since the birth of her baby. Her pain had been more or less constant, but most severe when the bowels moved, and attended by a thin irritating discharge. She was emaciated and extremely nervous and showed signs of having suffered severely. Upon examination of the rectum I found great tenderness and the parts so sore and irritated as to interfere seriously with making a proper examination. I finally succeeded, however, in discovering a deep, ragged fissure running from the anus clear across the posterior surface of both sphincter muscles. The whole surface of the rectal mucous membrane was inflamed and discharging a thin, ichorous fluid, which carried poison wherever it touched. The general appearance of the parts suggested an examination of the whole pelvic contents, which revealed the same red and highly inflamed, yet relaxed condition of the mucous membrane of vagina, cervix, and as nearly as I could determine, the whole utero-tubal tract, the uterus was enlarged, tender and discharging a muco-purulent

fluid, which originated in both tubes, both of which were also swollen and tender; both ovaries enlarged and extremely tender. No pelvic adhesions nor fixation of any organ, but all so sensitive that the examination had to be conducted with care. This examination brought out a history of gonorrheal infection which she stated was received from her husband some months before the birth of her baby; inquiry revealed the fact of a gonorrheal ophthalmia in the child. She had consulted two physicians before coming to me, both of whom had told her nothing could be done but to go to the hospital and submit to a hysterectomy. I immediately abandoned the idea of divulsion of the anal sphincters under anæsthesia, which I had thought of at first, before the vaginal examination, and without promising her anything, suggested electricity, which she very willingly accepted. I began by washing out the vagina and cervix with a hot sterile solution of common salt; after which I placed a water soaked pad, 4x4 inches large, under the hips, attached to the negative pole of the galvanic current, and to the positive pole attached a cotton covered, copper ball electrode placed against the os, well up in the vagina and turn on 10 ma. for 20 minutes, after packing the vagina with sublimated gauze, directing her to return on the second day. I kept up this treatment three times a week for two months with no change except to increase the volume of the current to 20 and later to 30 milliamperes. The treatment brought very marked benefit to my patient in many ways. I desire to add that I also had her use hot enemas per rectum daily, of a saturated solution of boric acid. The cervical discharge, however, continued to annoy, and I finally resorted in the intra uterine, mercury amalgamated zinc electrode for five minutes with a current volume 30 mas. once a week with a large dispersing negative electrode on the abdomen; in the intervals I still kept up the copper-covered vaginal with small pad on sacrum, smaller volume and longer time. With some variations, such as leaving off the strong intrauterine application and using such other therapeutic measures as seemed indicated, I kept up my treatment for a little more than one year, when I discharged my patient cured. The discharge, which was swarming with gonococci at first, was sterile some weeks before the patient was dis-

missed, and remains so now—one year afterward. The condition of the pelvic organs are natural, as far as can be determined, and the woman enjoys excellent health. The anal fissure healed spontaneously, or with no other treatment.

Case 2. Young woman, aged twenty-two. Came under observation October, 1901. Appearance good. Well developed and showing no external evidence of disease. Yet she had been suffering for three years and had been under treatment for pelvic disease by three physicians, two of whom are skillful gynecologists, and both of whom had urged hysterectomy, the last refusing longer to treat her without. She came to my office presenting the following history: Country girl, virgin (at least I have every reason to believe her such). Healthy family history, and had, previous to nearly four years ago, had good health, at which time she reports having caught cold while menstruating and was sick in bed for some time with fever and chill, from which she made a slow and imperfect recovery, trying afterward to follow her usual avocations, but most of the time being unable to walk much. She had other attacks at intervals, and finally, by advice of her family physician, went to see a specialist, who told her, after six months' treatment, she could hope for nothing without an operation. She then left this physician and went home for some months, afterward being treated by another specialist who refused, after three months, to treat her longer unless she submitted to an operation. This she had about yielded to when she was brought to me. The above history will suffice. Upon physical examination I found all the organs of the true pelvis massed together by inflammatory adhesions, so that upon attempting to move the uterus everything moved *en masse*. There was swelling and tenderness of the whole abdomen. Tenderness in vault of vagina extreme. Cervix greatly elongated. Womb fixed immovably. The abdomen so tense I could not map out the ovaries but through the vaginal wall I could make out the tube on the right side greatly swollen and boggy; the left swollen some, but no evidence of any fluid in it. There was an intermittent discharge from the cervix, not protuse, but bloody and mixed with pus. Menstruation very irregular, and painful during whole period with only moderate flow. Walk-

ing, more than a few steps carefully taken, was very difficult and followed by pain and soreness, and generally with rise of temperature.

Treatment consisted in thoroughly cleansing the vagina and for six successive days placing the negative, cotton covered ball electrode in vagina, and water-soaked pad 4x4 inches on right side attached to positive pole; sixteen milliamperes was used for ten minutes, followed by the rapidly interrupted secondary without changing contact, for twenty minutes. After the sixth day, the tenderness having subsided somewhat, I placed a small nickle olive point on an insulated carrier, and after sterilizing both electrode and cervix, passed it up the mouth of the right tube, and with a pad six inches square on right abdominal surface turned on slowly ten mas., with negative in the womb, for fifteen minutes the first time, afterward using the bipolar in vagina with high tension secondary for twenty minutes. The latter I used every day for its sedative effect and the intrauterine every other day; after the tenth treatment the tube on the right side emptied itself of a great mass of bloody water in a sudden gush, while she was returning to her room; she returned to the office two days afterward, reporting that she had been unwell and had suffered less pain than for four years. Examination revealed a collapsed tube with greatly diminished tenderness and a remarkably increased mobility. I then followed up with a negative, cotton covered ball electrode in the vagina, with a large pad on abdomen ten ma. ten minutes, followed every day by secondary fifteen minutes without changing contact, until she complained no more of pain, and general improvement had taken place. The weight in the pelvis began to disappear and she gave promise of a good final result up to the end of the sixth month, when she again began to complain of pain and tenderness. She had up to this time made very little perceptible improvement in the menstrual function. I now began to saturate the cotton on the negative ball electrode with a 5 per cent solution of tinct. iodine with a grain or two of potass. iodide in it to render the solution perfect. I kept up the iodine diffusion for another month with only very slow progress. I then began to use mercury cataphoresis, on copper ball, uncovered, according to Massey's method. I used it every other day in vault of vagina,

after thoroughly sterilizing same, turning on forty ma. for five minutes and changing location each time until I had the space around the cervix pretty sore. I then abandoned it and began using daily the vacuum electrode unipolar with the high frequency current for from five to fifteen minutes. The parts soon healed and still I found considerable tenderness, and the pelvis by no means free from inflammatory deposit. I now kept up my high frequency current with vacuum electrode and for three times at intervals of four days used the mercury application intrauterine on small zinc amalgamated electrode; after this the parts began to soften up and a symptomatic cure followed at the end of eleven months.

I do not know whether to credit myself with the best that could have been done in this case or not. I have read reports of cases, seemingly as bad, cured in a much shorter time, but I am inclined to believe my case a more difficult one than any so rapidly cured. Some may say eleven months was a long time to struggle with a case that could have been operated on in twenty minutes. Well, to one who has seen much of the hopelessness following emasculation and mutilation, remembering from what this young lady was rescued, and to what she is restored, the answer is self-evident.

Case 3. Lady aged thirty-two. Married nine years. Never pregnant. Good family history and has always enjoyed health until seven years ago, since which time she has been a constant visitor to some doctor's office, but, as she states, without any other result than gradually growing worse each year. She had finally been told that nothing remained for her but the operating table, to which she always objected. About eighteen months ago she was brought to my office. After a careful study of the case, my diagnosis was catarrhal inflammation extending up through uterus and oviduct of the right side, with moderate thickening and immobility of that side. The left tube also involved, but nothing more than the mucosa. The inflammatory process did not involve the deeper structures as it did on the right side. The ovary of this side was enlarged to twice its normal size and there was great tenderness, extending all over the right side and in the right fornix of the vagina. She was unable to do any work or to be on her feet but a short time without great suffering. The inner surface

of the cervix presented a well defined zone of deep red tissue extending about half way through from which hung the usual plug of mucus. The left side had escaped with but little involvement, but the right seemed to have been the gradual thickening of an inflammatory evolution, which sooner or later would have swept through the entire pelvis. Here was a case where two forms of treatment was indicated. The first being the secondary Faradic bipolar, as a sedative to these irritated tissues, followed by a few minutes of the constricting positive with a copper ball, cotton covered electrode applied for ten minutes with a strength of ten mas. This treatment I began with and followed until the tenderness in the side and relaxed tissues of vagina and uterus showed signs of improved nutrition. I then changed to a negative ball electrode in the vagina with large abdominal pad, turning on 10 mas., gradually increasing to 40 mas. twice a week, and in the interval each day using the primary coil with slow interruption for a few minutes only, followed by the high frequency current applied through a vacuum tube electrode attached to one pole of the machine, the circuit being closed by the patient holding in her hands a small geissler tube, the rest of the circuit being through the air of the room. I have since come to regard the return circuit as unimportant. This mode was kept up in the main for five weeks, when I ceased using the galvanic and gave her three treatments per week, alternating the high frequency with the static positive insulation for ten minutes. She has been well for nearly a year and is quite as rugged as any well woman.

It is very interesting to watch the progress of such cases as these, the rapid changes which take place are often phenomenal, as illustrated by almost any case of simply catarrhal cervicitis. Under the old regime any of these cases of catarrhal inflammation presented to the gynecologist a formidable task, well drawn out; but the skillful electro-therapist can at once control them, and generally cure them in a few treatments—often in two or three.

One peculiar necessity on the part of the physician using the currents is to be skilled in his diagnosis. A mistake in a diagnosis, or in current application, often not only delays, but actually renders a case much worse. I recall a case a number

of years ago, when I first began the treatment, of a lady suffering from a retro-versio-flexion. The flexion being acute and attended by great mechanical irritation to the rectum and severe menorrhagia. The vaginal wall was much relaxed with an abundant leucorrhœa. This I mistook as an indication for the positive pole and kept using it with a gradually increasing severity of the trouble, and somehow was unable to see my error until my patient all at once failed to show up and sent her husband to tell me she thought my electricity no good. Had I changed my technique right around so as to have gotten the softening effect of the negative galvanic with a stimulating, slowly interrupted primary, used with discretion, I should have helped my patient anyhow, and perhaps have cured her.

In reporting these cases I have said but little concerning special indications for the use of special forms of current. I have tried to portray, as nearly as possible, the pathological condition, leaving with the reader his own idea of the most desirable remedy to meet these changes, and then shown how much more effectually these indications have been met by the intelligent use of the electric currents than they could have been done by any remedies heretofore known. If I am to take the textbooks on gynecology, backed up by an experience of twenty-eight years, I am left with but little encouragement for results in any other field of therapeutics. In any or all of these cases very little hope presented for rescuing the patient from a life of pain and physical degradation. The surgeon's knife with its attendant ills perhaps promised more than anything else, but in this means we have no restoration in any case; if health returns to the unfortunate victim it must be at the sacrifice of that toward which any refined, highly cultured, or finely maternal mind must feel a sense of revolt and humiliation. Instead of such a spectacle think of an awakened molecular activity, a stimulated cell life, an increased glandular function and consequent absorption and elimination of old inflammatory products; a gradual but sure release of imprisoned tissue together with increased resistance and ultimate awakening to normal life and the joy of restoration with no mutilation, no emasculation, but all to hope for and all to live for.

Have I overdrawn this picture? Ask such men as Apostoli, Massey, Snow, Newman, Neiswanger and others who have given their toil and energy to the consummation of such possibilities. You will find no discord, no argument that does not fully corroborate in the main what I have said.

Century Building, St. Louis, Mo., May 1, 1903.



#### A SUIT FOR MALPRACTICE FOR AN X-RAY BURN.

The patient, a man named Shelly, brought suit against Dr. G. W. Spohn of Indiana claiming ten thousand dollars damages for X-ray burns upon his face and left hand. The patient was treated for a cancerous growth on the under part of his tongue. He was warned of the possibilities of a burn before the treatment was instituted. After about two weeks a slight dermatitis developed on the patient's face and the treatments were then discontinued. The patient claimed that the doctor directed him to hold down the lower jaw with his left hand during his treatment. It was proved on trial that the only real injury was to the hand and this was shown to be caused by infection of a wound on the hand. The hand became infected because the patient persisted in wiping the saliva from his mouth against the advice of his physician. The court decided in favor of the physician.—(Abstract from the Medical Review of Reviews.)



## Editorial.

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### MINUTES OF THE APRIL MEETING OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

The meeting was called to order by the President, Dr. Burdick.

The minutes of the March meeting were read.

Dr. Burdick called attention to the omission of the name of Mr. R. Friedlander from the list of associate members. The name had been acted upon by the Board of Directors. The minutes as corrected were accepted.

Dr. Elmer E. Prescott was duly elected to membership.

A paper was read by Dr. Burdick, on "The Treatment of Stricture by Electrolysis."

The paper was discussed by Drs. Brubaker, O'Neill and Grubbe.

The society then adjourned.

C. H. TREADWELL, *Sec'y.*

April 28, 1903.

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### NOTICE OF THE NEXT MEETING OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

The next meeting of the Chicago Electro-Medical Society will take place May 26th, 1903. 8 p. m., at 301 Schiller Bldg.

Dr. A. A. O'Neill will read a paper entitled: Electrolysis in its relation to scar tissue, constituting urethral and other strictures.

## Abstracts and Reprints.

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### THE TREATMENT OF STRICTURE BY ELECTROLYSIS.

(Abstract from a paper read before the Chicago Electro-Medical Society by Dr. Gordon G. Burdick.)

There are two general methods of treating stricture, one by the injection of an antiseptic; the second by administering large doses of some irritating balsam. This too often causes edema of the kidneys and in fact irritates the whole urinary tract even though a discharge is temporarily stopped. There are grave objections to both systems of treatment as usually carried out. The continuity of the mucous lining of the urethra is destroyed by strong drugs and cicatricial tissue is formed. This tissue, if disturbed, will break down and will contract more and more until the lumen of the urethra is diminished in caliber. Considerable force must then be used in micturation. Some of the urine will be retained and fermentation will take place. Infection follows and may extend through the ureters to the kidneys.

In cases of gonorrhea the tubercle bacillus may gain a foothold, in which cases it is very difficult to stop the discharge by ordinary methods. Presence of both gonococci and tubercle bacilli are proved by double straining.

The ordinary methods for the treatment of stricture are very inadequate. Dilatation of the urethra with sounds is objectionable because of the traumatic violence usually exercised, which opens up the deeper structures of the urethra to the gonococcus infection. The use of the urethrotome should be discouraged because every cut is replaced by cicatricial tissue and because the subsequent passing of sounds is very painful.

Newman and Lydston proved that the cicatricial tissue could be readily absorbed by means of the galvanic current. The negative pole is placed in contact with the stricture.

Their imitators failed through defective knowledge of the use of the current. Many operators easily dilated the urethra but found there was a subsequent growth of connective tissue. The method fell into disuse except in expert hands.

The olive-pointed metallic bougie used by Newman dissolves all cicatricial tissue encountered in the urethra but these are unsuitable for general use. I have devised a set of olive-pointed bougies for use on very tight strictures. The bougie is entirely insulated excepting a metallic blade that projects anteriorly. With this instrument the urethra may be dilated as large as required at one or two sittings without pain or discomfort. I then use the metallic olive bougie as a negative electrode, carefully insulting all the olive with gutta-percha excepting that part to be placed in contact with the stricture. I use a mild current of two milliamperes. The cicatricial tissue is absorbed without destroying the mucous membrane. The stricture remains patulous to the sound until a complete cure takes place. This method has been used in eighty cases, a few of which had had external urethrotomy. Many of my cases have been cured for three years.

My main trouble has been to control the infection. The X-ray will destroy the tubercular infection in obstinate cases, and only a few treatments of the ray will accomplish what many months of faithful treatment would not effect by other modes of treatment. *However*, some cases will not yield to the X-ray, and on these I have tried the high frequency current applied by a glass urethral electrode. The electrode is attached to a high frequency coil. Ozone is produced and by its marked antiseptic action readily destroys bacteria. Occasionally the bacteria are too deeply imbedded in the tissues to be reached by the above methods and it is then necessary to resort to copper electrolysis. A copper electrode is covered over with pericardium and is made the positive electrode. On being passed into the urethra the current drives the copper into the tissue. The treatment must be continued until the tissues are stained to a deep blue. About 2 ma. of current are used. Length of treatment, ten minutes once per week. The well-known antiseptic action of copper will destroy the infection.

The alternating sine current will accomplish the work even more satisfactorily than the direct current. Not only are the

copper ions sent into the tissues, but the irritating acid effect of the positive pole is neutralized at each reversal of the current. This prevents the hardening of the mucous membrane of the urethra. Tubercular ulcers in the urethra will granulate readily under this treatment and the pain and soreness will leave, when they have resisted other forms of treatment though applied faithfully.

All instruments used in the urethra must be thoroughly sterilized, although the mechanical construction of the electrodes renders this a difficult process. I have kept my electrodes in a solution of Formalin. They cannot be boiled because the insulating material will not stand the boiling temperature.

#### DISCUSSION.

Dr. Brubaker said that he could heartily assent to the statements in the paper for he was generally successful in treating stricture with the negative urethral electrode. He considered the method a great improvement over surgical and other treatments.

Dr. O'Neill said that the paper was too general in its discussion; it did not define absorption or electrolysis, the terms seeming to be used interchangeably at times. There was no differentiation made between recent or old strictures.

In 1887 he had become enthusiastic over the reports of Dr. Newman, and had tried the effect of the galvanic current on all favorable cases. On a very conservative estimation he had treated more than four hundred cases, and had been obliged to abandon the method. Some of his patients had been under treatment for a year and a half or over. The galvanic current, if of considerable milliamperage, is sure to destroy the surface epithelium, in which case an eschar would be formed and a stricture of greater density would result. There is great danger of producing this even when using currents of only one to two and a half milliamperes.

It is true that the application of the electrodes will for a time dilate the size of the urethra because the water will be driven out of the tissues, but the old condition is sure to return.

Dr. O'Neill asserted that it was absolutely impossible to destroy connective tissue, whether in the hand where the process can be seen or in the urethra, when using weak galvanic currents. If strong currents are used there will indeed be an electrolysis of the tissues, but connective tissue will form more abundantly in the area cauterized and a denser stricture will result. Such cases should be given into the hands of a surgeon. The patient will be but three to five days in bed.

Dr. Grubbe said that the paper related purely to treatment of the male urethra, but the same principles apply to the female urinary tract. In his experience the galvanic current is of decided value. No doubt Dr. Newman was enthusiastic; this, however, was only natural, for he was very successful in his early cases. Dr. Grubbe uses the galvanic current on all strictures, whether organic or functional. The treatment is applied under the most favorable circumstances when the patient can remain in the hospital where its diet, rest, etc., can be properly regulated.

The lining of the urethra is a mucous surface and is therefore moist because of the continual pouring out of its exudate. The resistance to the passage of the electric current will therefore be very small as compared with the resistance from the epidermis. It is therefore evident that one-half a milliamperere will accomplish what a large current would not do on a dry surface. It cannot be denied, however, that the surgical operation is also of value. It is good practice to increase the size of the bulbs two or three times at one sitting, thus insuring a considerable dilatation of the urethra. It accomplishes more than if only one size of electrode is used. The quantity of current should be regulated by the sensation of the patient; some individuals can take only a small current. Treatment can be carried out without causing cauterization.

Dr. Grubbe differed with Dr. Burdick as to the bactericidal properties of the positive pole, and the non-bactericidal quality of the negative pole. Most of the common bacteria cannot exist in an acid medium and are therefore destroyed at the positive pole, but the negative pole would certainly destroy bacteria that could not exist in an alkaline medium. It is altogether a matter for chemical study.

Dr. O'Neill arose to state that in speaking of the effect of the negative pole upon scar tissue on the skin, he had meant that the skin should be properly moistened.

Dr. Burdick said he was sorry that the paper had been misunderstood as being antagonistic to surgical procedures. He had a large male practice and had operated upon the strictures. But he had found that the patient could not perform his work satisfactorily for from four to six weeks. Instead of using the knife under an anæsthetic, he now uses a special electrode attached to the negative pole. This will pass through the stricture without pain to the patient. The canal can then be dilated with olive-pointed electrodes attached likewise to the negative pole. He did not agree with Dr. O'Neill that connective tissue cannot be absorbed under the action of the negative pole. He had used the urethroscope in a number of his cases and could see the size of the stricture diminish and the connective tissue disappear. One case had a small pedicled mass attached to the side of the canal. This he perforated several times with a negative needle and the mass sloughed out. There was no return of the scar tissue.

About a year and a half ago he performed his last operation on these cases. Since then he has used electricity. In that operation the bladder was distended and it was some three hours before he could pass the filliform bougie through the stricture and relieve the bladder. He cut through the stricture thoroughly and dilated with No. 20 sound. About 48 hours after this gangrene of the testicles set in and there was a large infiltrating abscess through the perineum. Fortunately he was able to save the life of the patient. The case illustrates how careful we must be under and in all conditions to guard against infection. We can get patients to submit to electrical treatment when they refuse absolutely surgical operation.

## REMARKS ON THE ORIGIN, FREQUENCY AND PROPERTIES OF THE ROENTGEN RAY BURNS.

DR. BRUNO SCHUERMAYER, HANOVER.

As it has always happened in medicine, there have been from the beginning authors who were able to explain the etiology of the X-Ray burn without their having been able to protect themselves and others against this accident. A few only could say that they had seen none or only sporadic burns, and it was their conviction that "Faulty Therapeutics," a "Too High Degree of Radiation," an "Incorrect Dosage," "Unsuitable Hardness of the Tube," "Too High Voltage," etc., etc., and similar kinds of nice sounding phrases, were the only cause of the accident. To get an idea of the significance of the X-Ray burns, we have first to ask, under what conditions they happened in a single case; secondly, how often they happen compared with the use of the ray. To illustrate under what conditions the burns originate, we select several instances from the literature of the subject.

## ACCIDENTS THROUGH THE USE OF THE X-RAY FOR DIAGNOSTIC AND THERAPEUTIC PURPOSES.

*Case 1.* Leppin; acquired himself a burn of the second degree (1896). This communication, which as the first possesses historical value, reads: "It may not be generally known that the much talked of X-Rays have the property similar to the rays of the sun to burn the skin. I did much work with Roentgen Ray and used my left hand as the most convenient object for examination. This hand after several days showed a peculiar redness," etc., etc.

*Case 2.* Fuchs. For the purpose of examining some tubes the own hand was radiated for about one hour, not continually, but with intervals. Right after, a stinging pain was noticed, especially in the finger joints, which later on became unbearable. In this a 16-inch coil was used, the intensity of the primary 20 amperes, pressure 12 volts.

*Case 3.* Marcuse, a 17-year-old patient, was radiated for about four weeks almost daily once, sometimes twice, for from 5 to 10 minutes for diagnostic purposes. Distance of the tube never less than 25 cm; the burn needed 2 weeks to develop.

*Case 4.* Schrivald. Patient 13½ years old; abdomen un-

covered; tube very strong; spark length 6 cm; distance of tube from photographic plate 35 cm; exposure 45 minutes. Time of incubation of burn, 2 weeks.

*Case 5.* Gocht. technique; older tubes of Miller-Hamburg. Pressure not under 50 volts. Number of seances, twice daily, 15 to 30 minutes; age of patient 3 years. Purpose, X-Ray Therapeutic removal of a nævus. Duration of treatment, for two weeks very intense radiations. Incubation 4 days, then erythema.

*Cases 6-14.* Albers-Schoenburg. Therapeutic application of the X-Rays; 30 volts; 4-5 amperes, about 39 minutes exposure daily. Distance, 15-25 cm; spark length, 15 cm.

*Case 6.* Lupus. Duration of radiation 6 months (with long intervals); reaction after 18 radiations.

7. Fifteen seances within 8 months; slight excoriation after 9 radiations.

8. Duration of treatment, 6 months, with long intervals. Reaction after 5 radiations; no excoriation.

9. Twenty-eight radiations within 3 months; reaction after 2 exposures; no excoriation.

10. Forty-six radiations within 3 months. Reaction after 7 radiations.

11. Eleven radiations within 1 month. Reaction after 4 radiations, which increases despite of stopping of treatment until the 16th day, when excoriation occurs. Healed after 23 days.

12. Left cheek 15 times. Right cheek 10 times; within 2 months. Reaction after 15 radiations; distinct excoriation.

13. Left cheek radiated 16 times within 2 months; reaction after 2 radiations; nevertheless treatment continued.

14. Sixty-eight radiations, long intervals. Excoriation after 27 radiations on one side of the side; after 12 radiations on the other.

*Cases 15-19.* Gassman and Scheakel. Lupus. Technique; Müller-Tube; 30 volts; 3 to 4 amperes, Kohl's 45 cm. coil. Duration 30 minutes. Number of interruptions 1400-1600 per minute, lead protection. Distance 20 cm.

15. Complains of pains after 19 days; dermatitis after 21



days; treatment discontinued for two weeks, dermatitis healed. New radiations; inflammatory redness after 13 days; heals after 6 days; treatment taken up. One radiation daily for 4 days, right after inflammation intervals of 18 days; again pains after 16 radiations. Total, 75 radiations.

16. After two days' swelling, complains of burning.

17. First a radiation of 20 minutes' duration; distance 15 cm. After 3 hours, redness and swelling of skin. After an interval of 2 weeks the same treatment. After 2 days again, reaction with dermatitis, increasing for the next 7 days. Treatment discontinued for 10 days; then 15 radiations, then again redness. After three more days skin comes off; discontinued after a total of 45 seances. After 12 days of this period, ulcer; after 26 more days, sloughing (combined with itching). After 3 more months necroses still on the increase. Twenty days later scraping was tried; at last with the help of other medication, healing after a duration of over 5 months.

18. Time of radiation 15 minutes. Distance 20 cm. After 19 days slight redness of skin, which passes into severe dermatitis.

19. Sycosis parasitica. Beside the usual dermatological treatment daily radiations. 20 minutes, 20 cm. After 9 radiations, redness and swelling; later dermatitis.

*Case 20.* Jutassy. Naevus of face. 1897. Technique; Kohl's 45 cm coil. 20-25 spark length, 22-25 volts,  $4\frac{1}{2}$ -5 amperes, distance 20-30 cm. Within 6 days, 8 seances, with a total exposure of  $4\frac{1}{2}$  hours' duration, consequently 30 minutes on an average. Reaction of skin in the form of a redness, which on the 10th day passes into dark brown. Slight itching. Speedy healing.

*Case 21.* Jutassy. Eleven seances, cheek and forehead. 10 hours, nose 4 hours; total 14 hours. Dermatitis after 20 days. Pain in jaw and bones of the face. After 2 weeks eczematoid excoriation. Healed within one month.

*Case 22.* Berall. Hypertrichosis of face. Technique;  $1\frac{1}{2}$ -2 amperes, 10-11 volts, distance 20 cm. Duration of each seance, 15 minutes, for 4 days; 3 exposures per day. For the following 9 days, 4 per day. On the 15th day, after a total exposure of 9 to 11 hours, tension of face and neck; deep brown discoloration. Mucous membrane of the lips swollen, hangs down in

shreds. Dirty covering on the gums, the hard palate and the mucous membrane of the cheeks. Nose and gums are bleeding, blisters on chin, throat, chest; oozing of a serous fluid.

*Case 23.* Deutschlander; skiagraph. Several exposures in succession, 5 within 2 days; the first one of 15 minutes' duration, the second half an hour later, 20 minutes. On the afternoon of the following day, 3 more exposures, the first of 10 minutes, the second of 5 minutes and the third of 2 minutes' duration, all within 3 hours. Technique; storage battery of 16 cells, pressure 34 volts, current strength  $2\frac{1}{2}$  amperes; 52-inch coil; high vacuum tube; 800 interruptions per minute. Distance of tube from plate, 30 cm; from the skin of the patient, 15 cm. Within 10 days erysipelatoid erythema; later excoriation and necrosis.

*Case 24.* Hoffa-Gocht. 1898; skiagraph of a patient who by another physician has for therapeutic purposes been radiated 36 times, each time from 25 to 40 minutes. Technique; primary current strength  $1\frac{1}{2}$ -2 amperes; 70 to 80 volts; 55 cm coil; 600 interruptions per minute. Duration of exposure 25 minutes; distance of tube from abdomen 30 cm. A month later X-Ray burn which caused a suit to be brought against Professor Hoffa.

*Case 25.* Testaz; seven exposures on 2 days of 25 minutes each and a distance of 1 (!) 3 (!), 5 (!) cm. The following day, skin yeast colored, which develops into an ulcer over a dollar size, increasing the following week to 10x20 cm. Patient is disabled from work for several months. Even after two years, healing not complete, the size of the ulcer being still 12x5 cm.

*Case 26.* Schürmayer (not published).

Hypertrichosis in a blonde about 30 years old. Two years before she had been treated electrolytically, but with no permanent success. As this case led to a forensic suit and as the details are of great value to the radio-therapeutic worker, I shall describe it more thoroughly.

Technique; Kohl's coil; 45 cm spark length with 5 amperes; not more than  $1\frac{1}{2}$  amperes employed, corresponding a measured spark length of 20 to 25 cm, mercury interruptor, 1500 revolutions per minute; tube Allgemeine Electricitäts

Gesellschaft medium soft, i. e., suitable for thorax skiagrams. Diameter of tube 17 cm, distance of surface from anticathode 7 cm, distance of anticathode from skin first, 27 cm; later 22 cm; at last 17 cm. Duration of each radiation, 10 to 15 minutes; extensive lead protection so that the whole face is covered by means sheet lead 2 mm thick and cut out diaphragms of as small size as possible to allow the radiation for the part to be treated. The lead goes below the skin as a protection for the neck a distance of 10 cm. The tube is always directed vertically to the surface of the "masque." First period of treatment from January 29 to March 27th, 1900.

Treatments were given January 26 and 28. February 1, 3, 5, 9, 11, 13, 17, 20, 22, 24, 26. March 2, 4, 7, 9, 11, 14, 18, 22, 26. Result negative; light terra-cotta like discoloration of the whole face which disappears on April 3. Second period of treatment from April 3 to July 24. Treatments given on April 3, 8, 14, 21, 26, 29. The return of a skin reaction. May 1, 5, 9, 11, 16, 20, 22, 26; June 6, 10, 16. Again light terra-cotta color; radiations interrupted until June 28th and while skin is just a trifle discolored, continued on July 7, 11, 23, whereupon the discoloration, without the patient feeling uncomfortable, increases. Patient leaving for summer resort, cure given up for the present. Result: the hairs, especially the big long one on the sides of the face, those on the upper lips and on the chin have fallen out; the fine lanugo hairs fall out easily; the result is, in regard to the very extensive original hypertrichosis, perfectly satisfactory from the physicians' standpoint. Third period. At the end of October, 1900, patient returns, dissatisfied with the result; she says that the hairs have grown again. From the physicians' standpoint this can only in a limited degree be admitted. Patient insists upon being perfectly cured and refuses to pay. She is told that the papers read at the congress in Paris and in Aachen have shown that the technique everywhere practiced is in favor of a more forceful treatment. If patient were willing, I would be, to apply such a treatment. Patient has from the beginning been instructed that burns may happen. She has twice shown the first symptoms of the accident herself. Also pictures of it have been occasionally shown her. She agrees to undergo any kind of treatment to get rid of the hairs. This period,

named forceful, was as follows: Technique as before, tube brought nearer to a distance of 12 cm; radiations of from 17 to 20 minutes' duration given on Oct. 14, 15, 17, 19, 22, 23, 24, 25, 26 and 27. First a trial was made if the skin, which looked perfectly normal, could stand such a treatment. After two seances, on Oct. 14 and 15, an interruption of one day, then radiations as indicated above. On Oct. 27, patient says she feels warm in her face, whereupon treatments were interrupted. I did not hear from the patient till November 9, 1900. On that day I asked to see her and found a swelling extending from the eye to the skin. Under careful treatment by means of salve dressings the whole skin of the face peeled off, but at the end of the year was renovated to the corner of the mouth without scars and without discoloration. Around the corners of the mouth were light little folds, while the chin, the neck and the chest down to the middle part of the sternum were denuded of epidermis and covered with a muddy detritus. In the course of two months this zone healed slowly, the lightly reddened edges of the skin forming new skin tissues and growing over diseased area, thus the higher level of the excoriated places being brought down to the normal level of the rest of the skin. Mention has already been made of occurring exurbations in the form of an erysipelatoid inflammation. In March, the patient went into another physician's care, because my treatment was not the right one, according to the statement of a physician who had never seen or treated an X-Ray burn.

After a latent time of 20 days, if we make the first radiation responsible, or after a time of 12 days, if we lay it at the door of the last radiation, we have a very severe burn accompanied with blistering and necrosis. Eight months are necessary to cure it, but part of the delay in healing is caused by unsuitable treatment.

*Case 27.* Schürmayer; unpublished. Capitalist, 40 years old. Therapeutic application of the X-Ray to relieve pain in gout. Radiation of the toes from the plantar side of the foot. Technique as above; no lead protection; distance of the same; A. E. G. tube, 20 cm; radiations of 15 minutes' duration on May 28, 29, 30 and June 1, 2, 3, 4, 5. As the pain had entirely disappeared, patient is discharged and warned to take good

care of the foot, which inclines to hyperidrosis despite of personal cleanliness. Also any exertion prohibited. But patient goes hunting for three days, whereupon five days after the last radiation, the whole planta pedis becomes painful, followed by typical X-Ray burn with blisters and partial necrosis, also of the upper layers of the cutis on the plantar side of the toes and in the folds between them. July 25, i. e., about 40 days after the first symptoms of the disease, patient was fully recovered again, the treatment following the principle not to irritate.

*Case 28.* Schürmayer. Lady about 30 years old. Brunette. Hypertrichosis of the face. (Not published.) Technique as above. Seances of 15 minutes. Distance of tube, A. E. G., 10 cm.

First the chin is radiated, no protection. The effective rays go a little from below toward the point of the chin. Seances on May 23, 24, 27 and 30; June 2, 4, 7 and 9. On June 12, a redness of the chin has developed which causes necrosis of the whole epidermis down to the larynx. This defect heals very slowly, but patient can with dressing make a trip in the middle of July. On August 26, after her return, healing is not perfect, the newly formed epidermis always peeling off under necrosis. Burn entirely cured on Sept. 6 and then the treatment of the lateral parts of the face is taken up. The new covered skin shows a peculiar pink color which makes a vivid contrast with the dark complexion of the patient. Changing the shape of the protecting lead, I continued the treatment during October, November, December, 1901, in such a manner that on alternating days the right and left side of the face were radiated. Under the influence of this treatment there appeared on the still reddened chin now and then pretty serious rednesses which, however, without any special treatment disappeared under the application of a cooling ointment. The hairs of the face now fell out without any reaction of the skin, slowly, but continuously; but the radiation had to be extended into the months of January, February and March, 1902. Then all the hairs disappeared in the last week of the treatment; there appeared on the left os zygomaticum a sudden redness and a slight swelling; an area of a little over a dollar size became even bluish red after several days. It

was kept by mistake in a longer contact with the lead screen. But the stopping of the radiations and the above mentioned treatment made the redness disappear by the middle of April. From the latter part of March until the middle of April there was an effluvium over and behind the left ear reacting in front to the zygomatic os. The area, two fingers wide, became perfectly bald without showing any reddening. Faradization by means of my "bi-polar double dry plate" in alternation with the faradic double brush caused a normal growth of the hair again. In the face irradiated so very frequently there reappeared on several spots a few hairs, which can, however, be easily removed. Under a longer treatment of the skin by electricity the skin on the chin changed so that one year after the beginning of the burn, not only the natural delineation of the skin has reappeared, but also the coloring became normal. The case was peculiar in that the same patient first developed an X-Ray burn with necrosis of the skin, which took a long time to heal. Then for nearly a half year patient was daily radiated without any irritation appearing in the face. As if by chance, toward the end of the treatment there were transitory symptoms of it, which, however, disappeared in a very short time. After discontinuation of the radiations there appeared on a limited area a malnutrition of the hair. The technique was, except some changes in the protection, always the same.

*Case 29.* Schürmayer (unpublished). Patient 24 years old; lupus faciei for 12 years; by amputation of the point of the nose ten years ago the process became more general, so that today the neck, the face up to the ears and eye brows are changed into area evenly covered with lupus nodules. There are areas of the size of a watch, thickly covered. From the middle of January, during February and March and during 13 weeks, almost daily, radiations. Technique as above. Hirschmann's tube with red-hot mirror. After 15 daily seances in January there was the following reaction: The whole face became dark red bluish, the skin stretched and shining, the face frequently bloated so that the eyes seem to retreat; also conjunctivitis at one occasion the beginning of a Keratitis in spite of lead spectacles. Mostly from Saturday evening till Monday evening, when there is no radiation,

the reaction has gone back under a simultaneous application of a cooling salve so that seldom the patient could not be radiated on Monday evening. Toward the eleventh week the reaction phenomena were so pronounced that even the eyes have disappeared entirely, but the patient always felt well; there was never any fever. Patient discontinues the treatment after 14 weeks. The result is surprising, but the reaction still present. Three weeks later she writes that the whole face is clearing up and the redness has entirely disappeared.

*Case 30.* Schürmayer (unpublished). Woman 50 years old; lupus of nose; had been present two years ago, which caused the performing of several operations. Now the whole point of the nose is gone. It looks very suspicious, rather as carcinoma. On the hard palate communicating with the nasal cavity and kept open by constant secretion, there is found an area the size of a quarter, covered with yellowish granulations. The discharge is fetid and corrodes the edges both on the nose and on the palate. Diagnosis doubtful. Carcinoma probable. Daily radiation for one month. After three weeks, deep reddening of the face around the diseased nose, severe "toothache," so that the seances were discontinued. Later on, during another month, about one every 8 or 10 days, the same flaming redness, but we do not pay any attention to it and keep up the radiation every other day. Result fine; not marred by frequent reactions of the skin of the healthy face. These cases could be multiplied, as Gocht, in 1899, counted over 70.

For our purposes the reported cases are sufficient to show that under the most widely different circumstances, often under a frightful influence of the rays, often after one radiation of a mild dose "*lege artis*," often even under the same technique and modus of treatment, over-reaction occur from obscure causes which have been above described as to their appearance and inner structure. The shortest time for the appearance of an over-reaction or a visible reaction is, after Albers-Schönburg as found in his own observation, from 2 to 18 days. Generally it took a longer time, 3, 5, 8, 10, 14 and 18 days; in one case which was irradiated for the epilation of hair on the chest it was impossible, despite a very small

distance and a new tube, to get a reactive reddening at all. The characteristic symptoms of all these "burns" is that they so often appear without any warning, suddenly, just as lightning from a clear sky; at other times only after a more or less long incubation. Typical for the majority of these burns is the slow healing, even under an adequate treatment and a careful holding off of every further irritation.

Translated from the *Aerztliche Rundschau* by Dr. A. Decker, Chicago.

[Continued in the next issue.]

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## THE EFFECT OF THE X-RAYS ON NORMAL AND ABNORMAL HISTOLOGIC STRUCTURES.

(Abstract from a paper by William Allen Pusey, A. M., M. D., read before the Chicago Medical Society.)

### CHANGES IN NORMAL TISSUES.

The epidermis is first affected. There is great increase in the number of the cells of the stratum spinosum. This is followed by an atypical karyokinesis. A complete disintegration of the cells may result. Similar changes in the appendages of the skin are noted which lead to alopecia, atrophy of nails, and glands.

In the corium the changes are of an inflammatory character, namely, exudation of leukocytes and of plasma. The connective tissue fibers are swollen. The inner coat of the blood vessels are inflamed and the cells exhibit signs of proliferation in some places falling off into the blood vessels.

### CHANGES IN THE DISEASED TISSUE.

Dr. Pusey's studies have been more particularly confined to carcinomata. Sections were taken from tumors in different stages of reaction. Sections taken from nodules on the surface show that the first effects of the X-ray is confined to the periphery of the cell masses. Some of these cells break down and disappear. The nuclei are broken up leaving only shapeless fragments that do not react normally to haematoxylin. The blood vessels are affected. Those within the nodule subjected immediately to radiation show the inflammation of the intima noted above. Others farther away from



the field of exposure do not exhibit these changes. When a carcinomatous ulcer has lost its nodular character, sections from it show that the diseased tissue is being filled by connective tissue. In the course of the treatment the changes seem to be a destruction of the superficial cells followed by those more deeply seated, the degenerated substance being absorbed.

A very important fact is that the changes in the blood vessels do not precede changes in other tissues, since they follow the first changes in the epithelial cells. It seems evident therefore that the changes in the cells are not primarily the result of disturbance of the circulation.

It must be our aim, then, to produce a degeneration and absorption of diseased cells, replacing them by healthy connective tissue without destroying healthy stroma.

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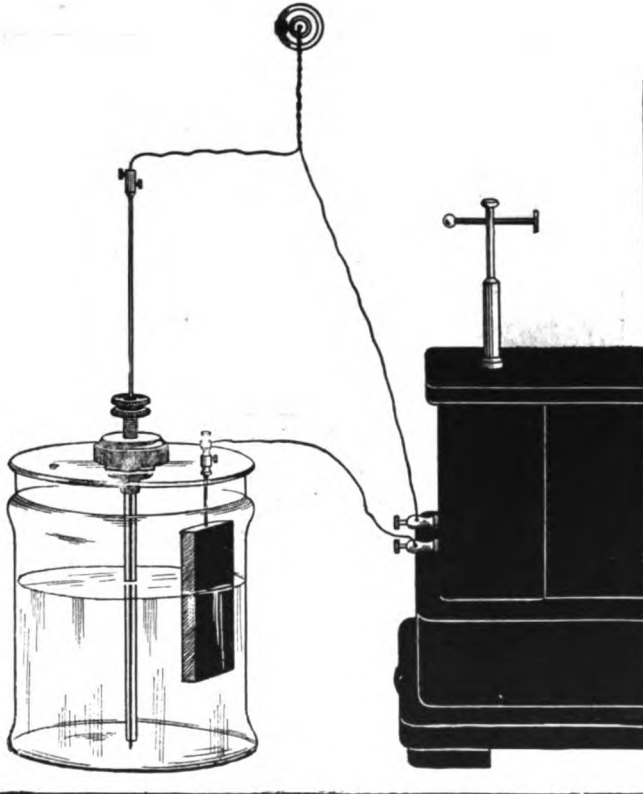
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# American Electro-Therapeutic and X-Ray Era

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## Original Contributions.

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### INJURIES, THEIR X-RAY DIAGNOSIS, CLINICAL AND MEDICO-LEGAL FEATURES.

By J. Rudis-Jicinsky, A. M., M. D., M. E., Cedar Rapids, Ia.

A very important application of the Roentgen ray we will find in connection with expert testimony in the courts in cases for damages, etc. The skiagraphs produced now show us the internal structure of the bones, with most accurate depth and perspective, ligaments, muscles, cartilages, internal organs, foreign bodies, etc., with all the deviation from the normal, and are the absolutely true representations of conditions present, when made properly, and by skillful hands. These facts should be the best and sufficient proof that we have not to deal with a shadow picture only. They are the best advisers, the best experts and give testimony of such a character, that an arbitration between the arguing parties is made more possible with little loss: "*Fiat justitia*," and more reform in the methods of using medical men as experts. Each of the parties in a suit in litigation secures the services of the medical witnesses favorable to him, and leaves the witnesses to justify their testimony as well as they can. Then we have different opinions, antagonisms, and oftentimes self-defeating actions of the medical expert, which have almost brought our profession into contempt. With a skiagraph at our hand, all the clinical data of the case, description how the picture was made, with what tube, at what distance, the time of exposure, and all necessary details in our technique, we may repeat the same



procedure right in the court-room before the eyes of the jury, and furnish a proof of an actual evidence of weight, an evidence absolutely true!

The value of such a testimony is apparent, depending upon the expert's proficiency and learning in skiagraphy with all the knowledge in his profession of medicine and surgery. But this is very far from being the case in practice. None is so well able to judge of the competency of such a medical expert as one in the same profession. Yet medical indorsement of the medical expert is rarely accepted, because there is naturally aroused an idea of professional jealousy, and the most unfortunate thing happens, far too often, that the profession takes the word of a skiagrapher, who is not a medical man, perhaps an electrician, or photographer only with no knowledge of anatomy, etc., instead of seeking the true and scientifically made and explained picture from a colleague, who has given to the new branch of diagnosis and therapy his entire attention, time, experience, and has invested in costly apparatus. Hence there is only one course left; and that is to accept the existing conditions, and aim to correct them by time, education, and example.

Outen says, that an honorable, just compromise should be encouraged, whenever possible, with a desire to strict justice. And here in this field the skiagraph well made, gives us the best opportunities of compromise, a compromise, where honorable professional men rarely disagree, if dignity is maintained, and truthful, manly standard. Compromise will oftentimes permit a much nearer approach to strict justice than a court, which necessarily permits the conflict of truth and falsehood, frequently to the exclusion of justice. Compromise generally offers the purest and best form of economy, when the skiagraph is examined by both sides carefully, and the status present had to be acknowledged, by all concerned; for the plaintiff it takes away the sting of delay and irritating circumstance; for the other side it saves money and reputation. But if a compromise is not possible, and the case has to go before the jury, the evidence of a correct skiagraph is beyond doubt. It is direct evidence, an evidence of a witness that cannot be influenced and is altogether without prejudice. Our only excuse for writing upon accidents and their medico legal conse-

quences is that by attempting a special study of them, the medical and legal professions will possibly be led to give this subject more careful attention, and with the help of skiagraphy obtain absolutely correct diagnoses.

Just to see what the X-rays can do for us let us consider the following cases, which found their way into the courts, the skiagraphs being ordered by the court, and their admission as a part of the evidence, sustained.

Case R. J. A., railway accident. Brakeman injured when coupling the cars. Three ribs fractured on the left, over the heart, and on account of constant irritation the lungs inflamed and painful. Skiagraph made; exposure ten seconds; no lesion found; the ribs over the heart not fractured at all. Lungs are transparent on both sides, proof that they are healthy. The heart shadow shows very well, the apex in normal condition pointing to the left. Just to compare fractured ribs with those normal a smaller skiagraph of another case was used for illustration. When these findings were announced the case was compromised on the basis of traumatic neuroses.

Fig. 1. Case Miss H. against a city. She slipped on icy sidewalk and made the city responsible for it, asking for \$10,000 damages, and claiming a fracture of the right external malleolus, with permanent deformity, the foot being drawn inward. Medical and X-ray examination ordered by the court. The medical examination showed beyond doubt that the plaintiff was suffering from hysteria, or that we had in this case "a hysterical joint," and the skiagraph, giving all the structures of the bones with a beautiful depth and perspective proved that there is not and never was a fracture at all in the ankle joint named.

**Fluoroscopic Examination.**—Right ankle; the fibula not broken; examined the whole length and circumference of the bone; no Potts fracture. The end of the fibula, or the external malleolus not broken at all, and never was fractured, the bone being smooth on the surface, and the marrow cavity regular, absolutely no roughness or callus formation; no fissure or stellate fracture; the external malleolus normal, no diseased condition of the bone and no splinter separated from the external malleolus or any other small fragment detached from

the same or the internal malleolus. The tibia found in good condition, no fracture; same with astragalus; os calcis; cuboid; scaphoid; internal, middle and the external cuneiform bones; the metatarsal bones and phalanges. Phalanges are deformed due to pressure of the shoe. At the articulation of the first metatarsal bone with the phalanx a compact, hard, bony tumor, consisting of solid bone, being the ultimate stage of cartilaginous tumor, usually due to pressure. It is at the favorite locality, at the great toe, other bones being not affected.

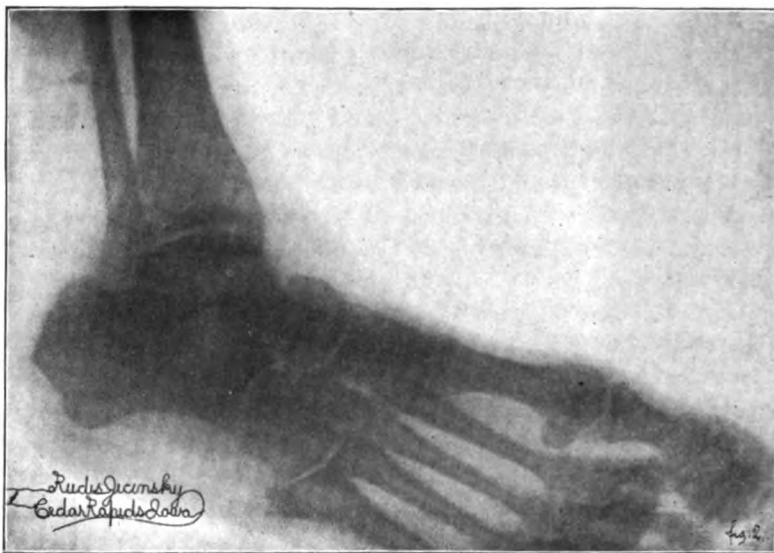


FIG. 1.

Description of the Skiagraphs.—Same case. Static machine used for excitation of the Improved German Tube, No. 3. Extra large size. Cramer's X-Ray plate employed, 8 by 10 inches. Two exposures made, first the external malleolus of the fibula directly against the dry plate, second the internal malleolus of the tibia as near as possible to the plate. Distance of the tube 15 inches from the plate. Bare foot, the ankle being directly under the anode focus point of the best rays, to secure essential correctness, and a good diagnostic field. Anode red hot and at its best in horizontal position, the plate

parallel to the same, the axis of the X-rays perpendicular, securing the best penetration with beautiful illumination of the ankle in proper position with the object in view to secure not only simple shadows but the internal structure of the bones, substance and perspective, individual layers of the muscles, ligaments if possible and all the detail. Exposure with the steady light and a brilliant glow in the tube. Bare ankle with external malleolus against the plate in envelopes—more to the right. My name in gold wire, and address laid on the plate, on the right side for identification of the negative; about four inches of the fibula and tibia on the plate, counting from the ankle. Plate developed by a photographer the usual way. Negative explained as follows: Right ankle. The sensitive plate after being exposed is called negative, because all the dense portions of our subject are shown as being transparent on the glass and the transparent portions of the subject are shown as being dense on the plate. These relations are rectified, however, in the print, which instead of being a negative has become a positive view. In X-ray photography the right ankle exposed will appear as a right ankle on the negative, but when printed, will have its position reversed so that it looks like a left ankle. There is no evidence of a fracture of the tibia or fibula, or any other fracture. All the bones are in good condition, showing the internal structure, substance of the bones with depth and perspective. The shafts of the bones are smooth and not rough or irregular as in case of fracture old or new. There is no callus formation on either of the bones, especially none on the external malleolus, which is perfectly normal. No fissure or stellate fracture. The marrow cavities of the bones are regular. There is no dark or white line in the bones, or their cavities, no mark of an old or new malleolar fracture to show a splinter separated from the external malleolus, or any fragment detached from the internal malleolus. There is no evidence of a fracture to four inches above the lower extremity of the fibula or tibia, or along the whole shaft of the bones; no fracture in the astragalus, os calcis, cuboid, scaphoid, internal, middle, and the external cuneiform bones, the metatarsal bones and phalanges. The articulations in the joint, tarsal and tarso-metatarsal, are perfect. There is absolutely no evidence of any fracture at all,

and never was. The shadow of Tendo Achilis is plain, not so the other layers of muscles, as Peroneus longus, Peroneus brevis, Tibialis anticus, Extensors, Flexors, etc., and the annular ligament. Phalanges are deformed due to pressure of the shoe. At the articulation of the first metatarsal bone with the phalanx a compact, hard, bony tumor, consisting of solid bone, according the shadow laterally to the head of the first metatarsal bone, and another one right over the same. The other bones of the foot not affected.

The usual examination of this case showed beyond the doubt by all tests, including the electrical test, that we had to deal with a hysterical joint occurring in traumatic neuroses, as the plaintiff claimed, beside the fracture, which never existed. There was not very great local distress at the ankle, but some pain at the hip; no swelling or redness, or pain to prevent passive movements, while active motion was next to impossible to accomplish. The parts around the joint were normal in size, but under the exceptional circumstance, being not used for many months, the internal muscles have undergone slight atrophic changes, having lost their elasticity, sensitiveness, and appearance, the foot being drawn in, as stated already. With the application of the galvanic current the muscles responded nicely and the foot could be brought in perfect normal position. At the hip there was an excessive hyperaesthesia of the skin, the slightest touch there produced pain. The pain seemed to be confined to one spot, near the acetabulum. This pain is seemingly intensely exalted when the patient is watching and noting the progress of the examination; but when blindfolded, well-pronounced pressure can be applied over the painful area. The whole trouble is therefore of a functional character. The jury gave the plaintiff a verdict for \$5,000, assuming perhaps correctly that the present state of conditions was due to a trauma anyway.

Figs. 2 and 3. Case J. M., railway injury. We realize that in treating of railway injuries we are not describing new and unknown affections; for, in general, the injuries done upon railways differ from those inflicted in other ways, only in degree and circumstances. At times, however, the intensity of the forces and the peculiarities of the circumstances of work, place railway injuries almost upon the plane of specialism.

In our case the man in question, fell from a box-car, arriving on the ground with both feet at once, flat. After elapse of a half year he cannot walk, both ankles are tender, and one spot on the left (Fig. 2) especially painful. He was advised to use two metallic plates in his shoes, and with the help of a cane he walks, but with much difficulty. It was Montaigne who said: "The thing in the world I am most afraid of is fear, and with good reason; that passion alone, in the trouble of it, exceeding all other accidents." And this case seems to be the

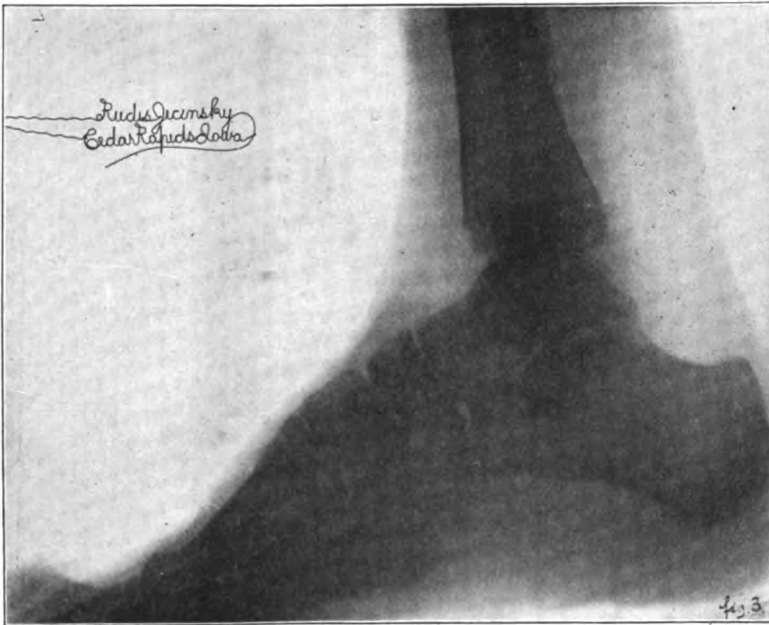


FIG. 2.

best illustration of it, giving us not only all the symptoms of traumatic neurosis, but the fear as a cause of psychic trauma with all the fear as regard to the future. The case was diagnosed as distortion of the ankle-joints, but the Roentgen rays, of course as usually, disclose the true condition. There is a plain fracture of the astragalus on the left, on the internal side of the bone, and the fragments are not united. Treatment consisted of application of all kinds of liniments, etc. The fluoroscopic examination gave us a peculiar shadow at the

inner border of the astragalus on the left, but the skiagraph explained the painful spot at once. There is some laceration of ligaments at the body of the same bone, the laceration giving marked and uneven haziness. The negative is certainly better, giving the details more perfect, but nevertheless we see the internal structure of the bones, the marrow cavities, the substance and depth with beautiful perspective, the pictures being made on comparatively very short exposure. On the right

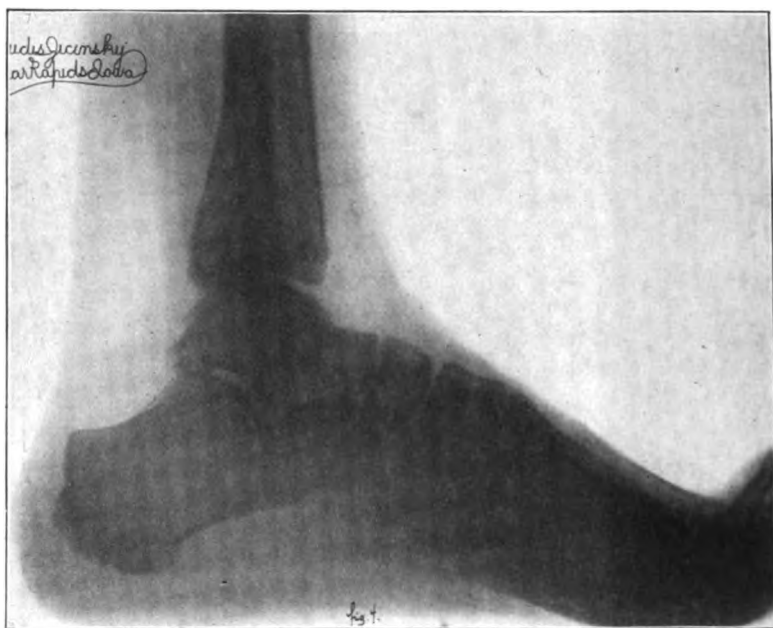


FIG. 3.

foot (Fig. 3) there is a peculiar haziness behind the tendo Achillis, showing a laceration of the ligaments near the astragalus, and also at the planter side of the foot. Otherwise the description of the pictures would be about the same, as in the other case of ankle, described above.



THE EVIDENCE OF ARSENIC AND INORGANIC  
POISONS AS DETERMINED BY THE X-RAY.

BY DR. MED. G. BRAUTLECHT, BREMEN.

The Roentgen ray has not only proved itself of great value as a therapeutic agent, but it is soon to become indispensable in forensic medicine.

Physicians are now equipped with a splendid method by which they may in difficult cases, to be examined for mechanical injuries, obtain the most exact diagnosis. Aside from this, however, the utility of the rays is shown in determining adulterations such as flour, coffee, saffron, etc. It will be of equal value in ferreting out the inorganic poisons which are now found in our daily consumption of food elements which threaten the life of mankind.

Assuming, as is well known, that all such bodies, which have a high atomic weight as well as a high specific weight, are more opaque to the Roentgen ray, I deemed it expedient to prove by means of the X-ray such inorganic elements in the body inasmuch as these elements are difficultly soluble.

For many reasons I directed my attention principally to the detection of arsenic and its compounds, and more particularly to the frequent cases of poisonings by arsenical acid and paris green, which, owing to their great toxic effects, stand foremost in this sphere. It was to be assumed that by reason of the high atomic weight of this metalloid, even a very small quantity, if not already dissolved, would be amenable to the Roentgen ray. In fact, the arsenical acid may be dissolved in a very insignificant portion, and but very slowly in water, as Taylor shows in the following condition:

In cold water.....i:	500-1000
In warm water .....	i: 400
In boiled water, for 1 hour....i:	24
In tea and beer.....i:	1000
In coffee and brandy .....	i: 500

We have already very accurate chemical and biological tests for arsenic which may not be dispensed with in the future in any case, but, the Roentgen-ray test can materially aid the otherwise tedious analysis and show the deleterious poison



in bodies as well as poisoned food in a shorter time. It is certainly a great advantage if one may at once detect by an X-ray illumination the insidious stuff. It cannot be under-rated that the court physician is thus enabled to prepare his preparatory statements, when a suspicion of poisoning is manifest and for substantiating the same in subsequent proceedings. Of special value will this Roentgen-ray method be for demonstration of incriminated objects before the judge or jury.

Arsenic, a metalloid, has an atomic weight of 74.9, and its specific weight is 5.73. It follows that its diascopic image must be at least as near as sharp as that of iron whose atomic weight is 55.9 and its specific weight 7.84. I became aware of this through my tests as follows:

Some grains of arsenic were given upon a spatula to a squirrel which it chewed and swallowed. It died with the usual symptoms after five hours. The body was illuminated and photographed. It was shown that the most minute particle of the metalloid, which in several positions was but a fracture of a milligram, gave just as deep a shadow in the squirrel as an equal sized pellet of iron might show. The corresponding limited arsenical acid contents ( $\text{As}_2\text{O}_3$ ) must therefore become relatively a thinner shadow on the radiograph. In 100 parts of this substance, 75.78 are As, and 24.22 O. Paris green is a combination of Scheele's green ( $\text{CuHAsO}_4$ ) and acetate of copper oxide, Cu ( $\text{C}_2\text{H}_3\text{O}_2$ ), as well as Realgar ( $\text{As}_2\text{S}_3$ ) and Orpiment ( $\text{As}_2\text{S}_5$ ); hence, other arsenical combinations must give corresponding clearer shadows of which I have ample evidence with my investigations.

A dog was given a larger quantity of arsenical acid, mixed with raw meat. The dog thereupon vomited quite forcibly, so that at a later section no trace of meat or food particles were visible. Notwithstanding this, the animal died after eight hours with the symptoms of a typical arsenic poison. The radiograph showed likewise the poison in the stomach and along the alimentary canal quite plainly, but the shadow is less intensive than the one of the metallic arsenic as shown in the first figure.

The second picture exhibited the extirpated stomach, and viscera of the dog; it was seen that even the smallest particles

of arsenic are manifest after illuminating the animal entirely. Aside from this, I also diascoped the vomited sputum and the excreted feces, which I collected upon celluloid saucers for photographing. In both instances, as was anticipated, the poison was plainly discernible.

The Roentgen picture, taken from an excised stomach of a human being, would prove to be an important adjunct in a judicial investigation.

Since I obtained no cadavers of persons who died from arsenic poisons, I had only recourse to human corpses in which I introduced at a post-mortem examination, a quantity of arsenic acid, mixed with water that was infused through the oesophagus into the stomach. The radio-gram of the body showed no traces of any elements, nor was my repeated effort upon a very emaciated body more successful. This negative result is plain enough if we consider that in these experiments, the arsenical particles were necessarily of microscopic size and were embedded in tissue of considerable density.

A very good picture may be obtained, however, if the stomach were alone photographed, in which the arsenical particles are invariably reproduced. The results I obtained by my diascope examination from poisoned foodstuffs, such as rye, whey, bread, meat, sausage, spinach, etc., in which I succeeded in exhibiting most beautifully the suspicious shadows. Thus, I observed in a combination, some spinach mixed with paris green as also in a rye-whey in which I had infused 1 gram arsenical acid. This mixture was allowed to remain intact for 24 hours and subsequently radiographed. It was shown that the arsenical acid for the most part remained undissolved and that the minutest particles were discerned by means of the Roentgen ray. I made the same attempt with the sublimate and rye-whey (1:100). This, I likewise allowed to stand for 24 hours, but, in this the radiograph exhibited that the poison was totally dissolved; not even the least particle in the rye-whey was visible. (Dissolved sublimate is as 1:16 in cold, 1:3 in boiled water.) A radiograph was made of a piece of meat with bones about 2 cm. thick, into the middle of which a centigram of arsenical acid was introduced while a decigram of the same poison was infused into the bones

and then radiographed. While the other organic combinations, and notably the meat have a specific weight, which is about the same as that of water, and while the compound organic combinations are generally elements with a lower specific weight, such is not the case with bones. These latter contain principally calcium (atomic weight, 39.90; specific weight, 1.587) and phosphorus (atomic weight, 30.96; specific weight, 1.83). If we now compare the weight of these elements with those of the arsenic, the atomic weight of the same is somewhat double while the specific weight is about four times as great as the above mentioned elements. It follows therefore that the arsenic will reveal itself in various places, even if surmounted by bones.

It is evident that the radiograph cannot furnish any evidence of the exact amount of arsenic in any tissue; the radiograph is of use only in preliminary work. Deep shadows will be shown by all the substances of a heavy atomic as well as a high grade specific weight, *e. g.*, calomel, bismuth and tartar emetic. To estimate from the depth of the shadow-graph any result may not be permissible, since the exposures, the thickness of the subjects, the strength of the Roentgen ray and the further preparations of the plate form important factors against exact conclusions.

If now, before the installing of the chemical investigations, one has particular parts of the body or food elements in which the poison was contained and was radiographed, before the chemical analysis destroyed them, we have then a splendid helpmate with which we may show to the court or jury the presence of the poison in conjunction with the chemical analysis. Under certain conditions, the absence of the arsenical shadow may be of great value. During diagnostic dissection, shining albuminous kernels are frequently seen in the stomach and viscera of poisoned persons, which might be thought arsenical particles. Such a case I witnessed at a judicial investigation, when a deposit of powder-like substance was seen upon the outer wall of the stomach, and under the lower side of the liver, which the demonstrators believed consisted of fat acid salts, while later a consulting chemical expert declared that the substance consisted of arsenical particles, since during the analysis with the Marsh apparatus a faint glimmer

of arsenic became visible. It was, however, shown after four hours that this very faint arsenical mirror was due to arsenical reagents. (Murder trial, Kash, Bremen, 1901.) Such cases of deposits may give rise to discussions, which can assuredly be avoided if the X-Ray is primarily applied.

The Roentgen ray may likewise prove a valuable auxiliary, as may be shown in the following procedures: I radiographed some arsenical pills. The picture showed a fine dotted surface. Subsequently, I secured a number of various pills, which I likewise radiographed upon the same plate. The several pills comprised the following:

1. Pil. Ferr. Carboni.
2. Pil. Bismuth Subnitr.
3. Pil. Ichthyol.
4. Pil. Aloe et Ferr.
5. Pil. Ferr. Jodat.
6. Pil. Chin. cum Ferr. Lact.
7. Pil. Asiatic.
8. Pil. Ferr Lact.
9. Pil. Ferr. Redact. cum Chin.
10. Pil. Kreosot.

After I was enabled to develop the plate, I could at once single out the dotted arsenic pills. These observations exhibit a parallel to the investigation as they are employed with the X-ray for determining imitations of precious stones, coffee beans, etc.

The arsenic combinations owing to their giving deep shadows are specially designed for the topographical demarcations of the soft parts, such as oesophagus, stomach, alimentary canal and trachea. These may not be applicable in practice owing to their extreme toxic qualifications, but when applied to animals, render many interesting data.

I also obtained likewise through the arsenous combination better results than with most other preparations, with which I obtained the contours of the stomach and the alimentary duct in animals by the radiogram. It depends somewhat upon the severe vomiting phase which supervenes and when the arsenous combinations are generally disseminated on the stomach walls, while the paris green more particularly shows

a greater adherence than most other poisons, since it combines with the saliva and thus penetrates intimately into the inner stomach cavity, which cannot be dispelled by large quantities of water.

A squirrel, to which I gave a larger quantity of arsenic acid, died after nine hours. The entire contours of the stomach and accompanying alimentary parts exhibited themselves in a most attractive manner. The dog to whom I gave paris green died after nine hours after some severe attacks of vomiting the contour of the stomach was clearly shown in the radiograph.

May I now recall your attention to the following result: I gave to a dog a quantity of paris green, which is known to be a very fine powder. The dog died after about ten hours. In the dissection, it was found that the windpipe had been completely coated with the paris green, which the animal had respired into the windpipe. After closely examining the Roentgen radiograph, I noticed how the windpipe was plainly marked in the diagraph.

It will remain a question for future tests to distinguish a body of higher specific weight, which is not dangerous to organisms. Such an attempt has already been made, and to show how a fine dissemination of any element is manifest over the secretory surfaces, and at once administer an emetic.

(Translated from Fortschritte auf dem Gebiete der Roentgen Strahlen.)



RADIOTHERAPEUTIC OBSERVATIONS.

JOSEPH ZEISLER, M. D.

Professor of Dermatology, Northwestern University, Chicago.

(Abstract from the Journal of the American Medical Association.)

The author mentions the two opinions held by radiotherapists regarding the active principle emanating from the Crookes tube. He believes with Kienboeck that the X-ray themselves are the efficient agents and not the electro-static discharges as held for some time by Freund. He uses an induction coil, mercury-spray interrupter, a voltage of from sixty-five to eighty-five and an amperage of one and a half to four in the primary. He regards these figures of little value for comparative purposes unless an identical machine is used. The essential element is the character of the X-ray obtained from the tube.

METHOD OF ADMINISTERING THE RAYS.

"Two principal methods of employing the rays may be mentioned. The one first advocated by Schiff and Freund, and followed by Pusey, is to use a soft light in short sittings in frequent, even daily, intervals until a reaction sets in. This is surely a safe method though rather slow in many cases, and as for out-of-town patients, who come for an occasional treatment only, quite impracticable. The other plan, according to Kienboeck, is to give what he calls a normal exposure, *i. e.*, the use of a powerful light for a period of about twenty minutes in a single sitting, after which an interval is allowed and the reaction is waited for. One such normal exposure will often be sufficient to produce the dehiscence of hair from the radiated area. This method requires a good deal of experience. I have followed it repeatedly and have never had any serious consequences. I have more often, however, taken the middle ground and have used ten-minute exposures at intervals of a day or two to the number of from five to eight, when usually a decided reaction would take place. The proper method to be followed will depend to a large measure on the nature of the case and other circumstances, as I may mention later on. Whoever is making extensive use of the Roentgen rays is bound to have, sooner or later, some

unpleasant experience with the much-dreaded X-ray burns. This is due to the well-known observation that the effect of the radiations is cumulative and that the reaction, even after powerful exposures, requires eight to ten days to become at all noticeable and will then gradually reach its climax within the following week or two. Unfamiliarity with this important fact may lead the beginner to persist in continued strong exposures up to a point when damage can not be undone. The three or four cases in which I produced a powerful reaction, consisting in acute dermatitis with oozing, crusting, etc., yielded readily to simple treatment within a week and caused little anxiety to either patients or myself, and left no permanent injury. I have never caused any sort of ulceration or sloughing. This may be explained from the fact that the light from the soft tube, which I have employed exclusively, has a rather superficial effect and does not penetrate into deeper tissues. Yet I feel that in the future even temporary dermatitis will easily be avoided by me, and my remarks may serve to keep others from similar accidents, for the ideal way of using X-rays in the majority of cases is surely to produce our results with the least irritation. In this connection a word about individual idiosyncrasy may not be amiss. Kienboeck believes that there is no such thing. Still the time required to produce a reaction surely varies in different patients, and particularly is there a notable difference in the resistance in various tissues. Pathologic cell aggregations, for instance lupus nodules, will be influenced much more readily than normal skin."

#### REPORTED CASES.

During the period of six months, 81 patients were subjected to radiation; one case each of lupus vulgaris, lupus erythematosus, scrofuloderma, all three showing marked improvement but still under treatment; 34 cases of acne of all forms, 9 cases of epithelioma, all showing symptomatic recovery; 4 cases of eczema, 3 of psoriasis, 2 of hyperidrosis nasi, 11 cases of hypertrochosis, 4 of sycosis, 3 of keratosis palmaris, 1 of pruritis, 1 of clavus, and 3 of non-dermatologic affections.

We give in full the author's remarks on several of these lesions:

HYPERTRICHOSIS.

"I have often heard the remark from colleagues engaged in this line of work that they consider the treatment of hypertrichosis by Roentgen rays as a very delicate and uncertain affair. One of them, in answer to my direct question, once mentioned that he had given over seventy exposures to a woman thus afflicted. My own experience in the eleven cases thus treated have made me rather optimistic concerning what can be accomplished here. I have invariably made use of what has been before referred to as normal exposures, and have found that three to five such exposures, given at intervals of a week or two, will produce complete epilation. As several of my patients were living out of town and could come for a treatment only at long intervals, this method was the only one to be selected. The reaction consisted, as a rule, in marked pigmentation and temporary erythema which yielded gradually.

"My patients have all been instructed that the epilation following one series of treatments is not to be considered as permanent, but that radiations should be resumed at intervals of, at first, two months, and later on longer periods without waiting for a return of the hair.

"Whoever has had much experience in the electrolytic destruction of superfluous hairs will be bound to consider this new method a veritable boon to both operator and patient. One lady, with a very extensive growth all over the chin and somewhat on the cheeks, and who had formerly received many electrolytic sittings at my hands, remarked to me, after her third X-ray treatment, when all the hair from the radiated surface had fallen out, that she would never under any circumstances again submit to the electric needle.

"As regards the final effect on the skin, I have been unable in my cases to verify Ehrmann's observation of an atrophy of the skin following this treatment."

ACNE.

"The thirty-four cases mentioned above comprise several varieties and all degrees of severity of acne. Five of them were instances of acne rosacea; one belonged to the type of acne necrotisans; four cases were indurated and pustular acne



of the back and shoulders. The bulk of them were, of course, of the ordinary type of acne of the face, many of them of the very severest and most rebellious nature. It would entirely surpass the intention of this communication to go into details of all these cases. I would only remark in general that their management differed considerably from that employed in the previously named affections, in that the exposures were rather mild in character, the distance of the tube, according to its light, being from 20 to 40 cm.

"My plan in these cases is usually to start in with three treatments a week for from two to three weeks. After this exposures are given twice weekly only for a time, and later on about once a week. A beneficial action can usually be noticed during the second week, when few new pustules are noted and the comedones seem to shrink and dry up. The accompanying seborrhea oleosa of the face is very promptly influenced. Some of the severest cases which I have ever treated were cured in from four to six weeks and have so far remained well.

"If I think of the many years of hard and persistent work which I have formerly given these cases in the way of local treatment, consisting in the opening of abscesses, the removal of comedones, curetting, caustic applications and the like, with but fair results, and compare with that my present management of these cases and its almost uniformly excellent therapeutic effects, I can only regret that Roentgen's wonderful discovery was not made twenty-five years ago.

"I am not prepared to draw final conclusions from my observations as to the etiologic nature of acne, but my long-held belief, that constitutional causes are foremost in its production, has now become considerably modified."

#### KERATOSIS PALMARIS.

"I am sure that most dermatologists will agree with me concerning the great difficulty of successfully treating this condition. My own experience, at least, has always been very disappointing. The three cases of this affection which I submitted to radiotherapy were inveterate forms and covered in one instance the palmar surface of both hands, including the fingers, and in the other two circumscribed patches of the

size of a dollar on each palm. The effect of the rays in these cases was, to say the least, surprising. One case seemed perfectly restored after five strong exposures."

CLAVUS.

"Case 4.—About the middle of July I was visited by a young gentleman, 23 years old, who complained that for the past two years his life had been made perfectly miserable by the presence of numerous soft corns on the soles of his feet. The affection was symmetrical and consisted in upward of sixty soft corns distributed over the plantar surfaces of all the toes and the adjacent regions of the sole. While a single corn may be a trivial affection, a trouble like this one surely deserves the earnest attention of the dermatologist. I learned from my patient that all sorts of treatments, including excision, keratolytic ointments, special pads, etc., had been tried in vain, and I therefore resorted at once, as an experiment, to the use of the X-ray exposures. I gave twelve daily exposures with a strong light, at a distance of 10 cm., for ten minutes each. No visible reaction resulted, but the treatments had to be discontinued as I left for my vacation. Three weeks later, when I returned, my patient exhibited his feet to me, and to my great delight he was absolutely and perfectly free from all his corns and has remained so to this day."

The author agrees with Scholtz and others that the rays have special selected action on cathologic cell formations, causing finally the destruction of the cells. He says in conclusion the following:

"I can only say that my experience with radiotherapy so far has made me an ardent advocate of it, and I believe that until it is replaced by something still more marvelous it will constitute one of the most effective weapons in our fight against a large class of dermatologic affections."



## THE ETIOLOGY OF CANCER.

Notwithstanding all the work done in cancer etiology, one of the best European authorities, Professor Lubarsch of Posen, in Germany, a man who is thoroughly familiar with the whole subject and who has evidently spared no pains to get at all the recent publications, gives it as his conclusive opinion that we are as yet not in a position to say anything definite of the cause of malignant disease. He says that while it is clear that all forms of malignant neoplasms resemble each other so much as to make it sure that if one is due to parasite the others are also, we have as yet no sure evidence that a parasite is the actual causative agent. On the other hand, Professor Lubarsch considers that there are groups of true neoplasms histologically different from carcinomata which yet share with them the destructive properties of giving metastases and causing cachexia, with regard to which, however, a parasitic cause is out of the question. Even in the epithelial group of the carcinomata there are many special classes of tumors whose peculiarities would be very difficult to explain on this score. He adds that even if the etiologic role of parasites in the causation of a malignant disease is to be accepted, there are other causes that must be considered to have at least equal value. Chronic irritation seems, for instance, especially for many epithelial carcinomata, to be an almost indispensable predisposing condition. Without the preparation of soil, developed by frequently repeated irritation, the epitheliomata fail to make their appearance. The presence of embryonal or postembryonal cellular material included in certain parts of the tissue, with a special tendency to take on an excessive formative disposition, seems to be another predisposing cause without which many neoplasms would not develop. In any theory of cancer etiology, then, these conditions and their effects will have to be taken into account quite as well as any supposed influence of parasites. As a matter of fact, it is not definitely settled yet whether cancer may not be originally a lack of vitality in the connective tissue rather than a surplus of vitality in the parenchymatous tissues. The normal state of the cellular tissues consists of an equilibrium of cellular forces so established that the constituents of the supporting tissues and the more specialized cells of the various organs have just enough resistive

vitality to keep from interfering with the growth of one another, or, on the other hand, of permitting overgrowth on the part of their neighbors. Weigert and Roux have insisted that neoplastic formation is usually due, not to an acquired *nisus formativus*—a special new tendency to overgrowth—but to the disappearance of the resistive factors which have hitherto controlled the normal *nisus formativus* always present. A certain amount of neoformative power must always exist in order to keep any organ up to the standard necessary for function, and it is the failure of the connective tissue properly to limit this force that constitutes, under some circumstances, at least, the essence of malignancy. Once cells have acquired the habit of overgrowth, like microbes, they are prone to take on special virulence, and hence the occurrence of metastases and the development of cachexia because of the oversecretion of toxic cellular products.—*Journal A. M. A.*



#### UTERINE CARCINOMA; ITS TREATMENT BY THE COMBINED USE OF THE FINSSEN LIGHT AND THE ROENTGEN RAY.

George G. Hopkins contributed a paper of the above title to the Philadelphia Medical Journal of February 21, 1903. The patient is placed upon her back and the rays are directed upon the diseased surface through a speculum. He uses a lead screen to protect all the healthy tissues, but when applying the Finsen light the clothing over the healthy parts is sufficient protection. Long exposures can be given with the Finsen light even up to an hour, but only short exposures are permitted with the X-Ray. He mentions two cases where improvement was much more rapid by the combined treatment than when either agent was used alone. The exposure with the X-ray must be especially short after hysterectomy has been performed because there would then be no uterus to partly absorb the ray and the intestines might be unduly irritated.

## Editorial.

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Very little has been learned concerning the physical properties of the X-Ray since the remarkable papers published by Roentgen in 1896. A new set of experiments, however, has just been completed by Prof. Arthur W. Goodspeed of the University of Pennsylvania, president of the American X-Ray Association, on the secondary radiations produced by the X-Ray.

Prof. Roentgen proved that the X-Ray could not be reflected, but there has been evidence that they are irregularly diffused or scattered in passing through dense substances. Several experimenters have obtained images of metallic bodies that were placed behind the X-Ray plate. A paper was published in one of our issues of Jan., 1902, on "X-Ray Freaks," by T. Proctor Hall, M. D. In his experiments, different metal objects were placed behind the photographic plate, some of them producing dark images on the plate, others light images. Dr. Hall rejected as causes both direct and diffused reflection. He also considered that the assumption of secondary rays would not explain the phenomena.

In the experiments made by Prof. Goodspeed, the X-Ray tube was enclosed in a black box which prevented any optical fluorescence from entering the room while the X-Ray would penetrate the box. Heavy lead plates were placed on the top of the box and the radiographic films were placed upon these plates thus thoroughly protected from the direct radiation. Upon these films were placed various bodies including zinc, brass, wood, hand, etc. In every case unmistakable evidence of secondary action appeared. Prof. Goodspeed also noted the rather peculiar physiological effect of the X-Ray. After sleeping one night in a room in which he had been using the X-Ray during the day, he developed considerable inflammation of the eyes and throat. He noted the same effect on another occasion, but the inflammation subsided at once on changing sleeping rooms. He had at no other time experienced this effect during the day, though he had experimented for hours at

a time with the X-Ray. He attributed this effect to the secondary emanations of the X-Ray from the air or bodies in the room or the human body itself. He notes that this theory would necessitate the assumption that the emanations last for a considerable length of time after the primary rays have ceased to act.

While the photographic experiments certainly indicate a secondary radiation, we think the phosphorescent character of these secondary radiations is not proved. We use the word phosphorescent to indicate that the radiations last for some time after the exciting cause has ceased to act, although we recognize that the term had been applied solely to light radiation. A considerable amount of ozone must have been generated in the room during the discharge of the high tension current from the coil. Prof. Goodspeed notes that the room was nearly or almost closed preventing the free circulation of air. Unless the absence of ozone was proved it is less radical to attribute the irritation to this active agent. We await with much interest a further report from Prof. Goodspeed.

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## NOTICE

The next regular meeting of the Chicago Electro-Medical Society will be held in room 301 Schiller Bldg. Dr. A. Augustus O'Neill will give a paper on "Electricity in its Relation to Scar Tissue Constituting Urethral and other Strictures." A case of Carcinoma of the Breast will be exhibited by Dr. Elmer E. Prescott. The meeting will begin at 8:15 P. M. A large attendance is desired.

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## Abstracts and Reprints.

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### THE X-RAY PHENOMENA AND PHENOMENA NOT DUE TO X-RAYS.

(Abstract from a paper in the Cincinnati Lancet-Clinic by  
Percy Shields, Cincinnati, Ohio.)

The author first reviews the history of the investigations which led to the discovery of the X-ray by Roentgen. He then considers the various forms of apparatus used to energize the tube. He prefers the induction coil for skiagraphic work and the Tesla coil for therapeutic work. He considers the static machine inferior to both coils. He differentiates between the cathode and X-ray showing in what respect they resemble and differ from each other. He regards both the X-ray and the cathode ray as forms of energy somewhat similar to light. We here quote from the article:

"During recent years views on this subject have been gradually modified, and the opinion is now gaining ground that the atom is not a final and indivisible unit of matter, but that it is capable of being still further split up into particles termed, by Prof. J. J. Thomson, corpuscles. All corpuscles, whether of lead, gold or hydrogen, are supposed to be similar, and that the transcendently fine dust is the elementary matter from which the universe has been built.

"The most advanced theory as to X-rays is, therefore, that they are formed by the almost infinitely minute particles of the cathode stream battering against the platinum target and rebounding outwards at all angles from the point of impact, in the form of a shower of corpuscles. The most active X-rays are projected at an angle of  $80^{\circ}$ - $90^{\circ}$  to the line of impact.

"If we accept the corpuscular theory, then the penetrative power of X-rays depends on the velocity of the corpuscular projectiles, and their velocity will be proportional to the intensity of the cathode stream, which in its turn will be governed by the voltage of the current, tube vacuum, etc., etc.

"With the above theory it might also be possible to give

X-rays and cathode rays a place in the spectrum. It is a well-known fact that but the smallest portion of the spectrum is visible. We know that beyond the violet extends an invisible area, three times the length of the visible portion; how much farther this extends is at present unknown. We also know beyond the red, an area in which heat is developed, extends ten times the length of the visible spectrum. We speak of the various divisions of the spectrum as the thermic, luminous and actinic, all of which merge closely one into the other. Reasoning by analogy, we know that sunlight contains ultra-violet rays; cathode rays and ultra-violet rays are beyond question very closely allied; clinically both produce like results, chemically both affect the photographic plate alike. If by this method of reasoning we can place the cathode ray in the actinic or chemical portion of the spectrum, and since X-rays are but modified cathode rays, then have we not the right to infer that both cathode and X-rays are but another form of molecular or maybe corpuscular vibration, and should be added to the forms of natural forces which, if placed in the order of rapidity of vibration, would be heat, light, chemical, or cathode and X-rays."

RELIEF FROM PAIN NOT PRODUCED BY THE X-RAY BUT BY THE  
HIGH TENSION CURRENT.

"We will next turn our attention to some of the phenomena which clinically have been attributed to X-rays, that most commonly mentioned being relief from pain. I should like to state at once and with considerable emphasis that neither X-rays nor cathode rays play any role in the control of this symptom. I cannot recall seeing this in any of the literature on this subject, and yet how a fallacy so gross could have been so long countenanced is difficult to understand. It has long been known, and as often described in text-books, that currents of high potential would relieve pain, and yet after interposing a Crookes tube the result is at once attributed to the X-ray. This can only be explained upon the ground that the enthusiasm has been so centered on the visible green glow in the tube as to have diverted attention from anything that



was old. So again we wish to emphasize the fact that relief from pain by a high tension current is old, certainly older than X-rays.

"That a high tension current will relieve pain *without an X-ray tube* can be easily demonstrated. We have on numerous occasions been able to relieve the pain of sciatica, contusions, rheumatism, etc., by simply allowing the terminals of the machine to dangle near the patient just far enough away to prevent sparking. We have also found it impossible on numerous occasions to relieve pain due to gastric carcinoma and gastric ulcer with high tension current, and have been just as unsuccessful in these same cases with the X-ray. I remember very well relieving a shoulder painful from chronic rheumatism with a static spray, again at other times with the X-ray. In fact, we have noticed as constant that pain which could be relieved by the X-ray could just as easily be relieved without the tube, and *vice versa*. Manufacturers to-day make low vacuum electrodes similar to low vacuum Crookes tubes for applying high tension current, which, however, have no advantage over bare wires.

"If we again compare the action of X-rays and cathode rays produced in a Crookes tube with cathode rays emitted by radium or produced by sunlight, we can say that rays from these sources are not pain relieving.

"If, therefore, we can relieve pain without a Crookes tube, and if we know cathode rays from other sources *do not* relieve pain, are we justified in attributing the fact to X-rays? I think, without much further thought, this can be answered by an emphatic '*no*.' The prerequisites for the relief from pain are a high voltage, better coupled with a high frequency current.

"A most reasonable explanation which I would like to offer this evening as to the relief from pain is that the action of a high tension current of great frequency is similar to the relief of pain obtained by vibratory or oscillatory massage. But recently Dr. Mortimer Granville, of London, in speaking of pain in neuralgic affections, compares the pain to musical vibrations. He believes that the more acute the pain the more rapid the molecular vibration in the nerve; pain of a dull and

aching character bespeaks a lower rate of vibration, just as in music to produce the high note vibrations will be much more rapid than for the production of a lower tone. Vibratory massage, he claims, produces an interruption or an alteration in the molecular vibration of nerves, thus relieving pain. Pressure on a nerve causes numbness and insensibility beyond, which this same authority attempts to attribute to a complete blocking of vibration in the nerve.

"I but give this theory for what it is worth. Of one thing, however, we are sure, namely, massage does relieve pain. We also know that the various vibratory instruments in use to-day will relieve pain.

"If the theory of pain and its mode of transmission as expressed by Granville proves to be true, it will certainly lend much strength to the theory that relief of pain is due to counter-vibratory movements produced in the nerve by the high-tension and high-frequency current."

#### IMPROVEMENT IN CARCINOMAS NOT DUE TO THE X-RAY.

"For the sake of brevity we will consider the action of this agent on carcinomata. Our attention was first drawn to the fact that X-rays were not the curative agent in the treatment of this dread affection by observing the action in four cases of laryngeal carcinoma. Briefly, I can say that all the cases are dead but one, and his time can be counted by days. It seemed to us that if X-rays were curative, laryngeal carcinoma should be the ideal location for successful treatment. The parts are near the surface, and, if judged with the fluoroscope, the light readily and in quantity penetrates the structures. In this we were sadly mistaken. All the cases were unsuccessful. I admit we do read occasionally of a successful case, but I do not believe they will bear close scrutiny. I can further say that all our results with carcinomata beneath the surface were uniformly unsuccessful, and, as we believe, will continue to be so with this method of treatment. The results the world over for deep growths are called either absolutely negative or improving, which must also be considered negative, inasmuch as they all die. The answer to

such a result can only be that X-rays are not curative. Codman, in an article in the Philadelphia Medical Journal, of March, 1902, says: 'So few cases have been reported, and these in such an inexact and hypothetical way, that they seem to be undeserving of record.' Dr. N. Stone Scott, in his excellent discussion of this subject, finds no adequate evidence of existence of such lesions. The writer fully agrees with him.

"We can separate in a degree the active or curative rays from X-rays by interposing a sheet of foil between the light and skin. If this is examined with the fluoroscope we find X-rays in abundance. If this light be applied to the skin no reaction occurs. Again, it has been noted by all observers that a new tube and one of low vacuum is more effective than an older tube of high vacuum. This, again, would seem to indicate that X-rays are inert, inasmuch as X-rays are more penetrating in the old tube than in the new. At any rate, action on the photographic plate is more pronounced. It seems that the effective rays are the cathode rays. These rays are quite superficial in their action. Their action is limited very largely to the skin and subcutaneous tissues. To compare again the effective rays generated in the tube with radioactive radium or ultra-violet light, we are led to conclude that the cathode rays are the ones which bring about our good results in superficial epitheliomata, and, owing to their lack of penetrative power, a negative result has been obtained in deep growths. To sum up the evidence against the X-ray being curative, we can say:

"1. Deep growths are unaffected, although X-rays penetrate in abundance.

"2. X-rays 'filtered' through lead foil affect neither healthy nor diseased tissue immediately beneath.

"3. The similarity of action between radium and ultra-violet light with the cathode rays of Crookes' tube leads us to exclude X-rays as being therapeutically active.

"Beck some time ago mentioned symptoms produced on the part of the general system, such as nausea, vertigo, etc.; in animals he also noticed death followed prolonged radiation. I must candidly admit I can see no definite connection between the above symptoms and either 'X' or cathode rays. Nausea

and vertigo may have been due to other causes and have occurred incidentally to the treatment. We have never had such results in our cases.

"However, both nausea and vertigo as well as death may be accounted for by tissue destruction occurring in the skin layer or those immediately underlying, death in this instance being due to the same cause as burns due to heat, and must not be connected in any way with deep-seated action due to X-rays.

"The last feature to be considered is the bactericidal property of X-rays. There seems to have been quite a number of views on this point, and experiments seem to be decidedly contradictory. Differences in or lack of technique are the only way in which this can be explained. It must not be forgotten in exposing cultures to the rays that ozone is generated in large quantity, and may have possibly been responsible for variation in results. We exposed for variable periods of time cultures of staphylococcus pyogenes, with the result that the experiments were negative; bacterial growth remained entirely uninfluenced. This was also the result as reported some time ago by Zeit, of Chicago.

"In conclusion, to summarize what has been said regarding phenomena due to X-rays and those not due to this agent, we may mention:

"1. Relief of pain is due to the action of a high-tension current and connected in no way with 'X' or cathode rays.

"2. Cathode rays are the therapeutically active agents in the treatment of disease.

"3. Affections beneath the surface, as deep-seated carcinoma, are in no wise affected by X-rays or cathode rays.

"4. The only phenomenon which can be ascribed to X-rays is their ability to penetrate thick opaque bodies.

"5. Bactericidal properties of 'X' and cathode rays are *nil*."

Comments.—In the above article are some very interesting and very natural mistakes regarding the nature of both the X-ray and cathode ray. The statement concerning the theory of J. J. Thomson is correct regarding the corpuscular stream that make up the cathode rays. As stated they are a shower of particles which strike the anode. The X-rays, however,

are not held by anybody to be a shower of particles. Thomson and Stokes together with numerous physicists of England believe that the X-ray is an irregular electro-magnetic wave while light is now considered an electro-magnetic wave of regular recurrence. In a certain sense, therefore, the X-rays might possibly be said to have a place in the spectral field, although because they have irregular wave-lengths they would not be limited to a small area of the spectrum; but most emphatically we can say that the cathode rays are not a form of electro-magnetic wave and they could not have a place in the spectrum. On Thomson's theory the term wave-length when applied to the cathode rays is an absurdity. A number of German scientists hold, that both the X-ray and cathode ray are longitudinal vibrations, that is altogether different from light, but as the paper does not discuss this point I shall not make any further allusion to this theory. Let me, however, state again that cathode rays and ultra-violet rays are altogether different in nature, though as the paper states they both chemically affect the photographic plate, the ultra-violet rays cannot be deflected by a magnet while the cathode rays can. Ultra-violet light is a regular electro-magnetic wave possessing all the properties common to the light wave. The cathode rays are not a wave at all and they have only incidentally the photo-chemical properties of the ultra-violet waves.

We must also dissent from the statement that the X-rays do not relieve pain. We agree with the author that the cathode rays do not because they do not emerge from the Crookes' tube.

We agree with him that the static spray will relieve pain in many cases of rheumatism, sciatica, etc., just as does the X-ray, but the patient may be shielded from any electro-static influence that comes from the tube or the wires coming from the machine and even then the pain will be relieved. I believe that it is too early to state that we find cathode rays in the sunlight or that the radiations issuing from the metal radium and its compounds are the cathode ray. They are rather held to be waves of very short length. Personally I believe that the X-rays are not a simple kind of wave, that the rays emanating from the tube at different vacuums differ

remarkably from each other in their therapeutic properties. I believe that the more penetrative rays, namely those which could penetrate lead-foil, do not possess the curative power which the less penetrative rays exert, and this fact accounts for the observation noted by the author. As I said at first the paper makes some very instructive misstatements, and illustrates how careful we physicians must be when we begin to discuss the problems of physics. Mathematical symbols which are always crowded into articles on electrical research are apt to confuse us.

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#### THE TREATMENT OF EPITHELIOMA OF THE EYE- LIDS BY THE X-RAYS.\*

BY WILLIAM M. SWEET, M. D., OF PHILADELPHIA.

The X-Rays as a method of treatment in certain forms of malignant growths may be considered to have passed the experimental stage, and to have apparently established their superiority to operation in the relief of superficial affections like epithelioma. Apart from their use in the primary treatment of new growths they have a distinct value when employed after operation to prevent recurrence of the diseased tissue. What may be done by the X-Ray treatment of epithelioma of the tissues surrounding the eyeball is evidenced by the cases here recorded.

*Case 1.* Mrs. G., aged 84, was referred to me on February 14, 1902, by Dr. W. P. Goff, of Clarksburg, W. Va. About 12 years ago a slight roughness of the skin appeared on the side of the nose close to the inner canthus of the left eye. Four weeks later a crust formed, which, upon becoming detached while bathing the face, left a small ulcerated spot, from which a few drops of blood flowed. For several years afterward the process of temporary scabbing over continued without causing much pain or inconvenience, although there was a gradual increase in the ulcerated area. About four years ago the growth began to spread more rapidly, passing upward on the nose and also implicating the eyelids and the tissues of the orbit, the sight of the eye being lost in about a year. With the spread of the ulceration there was itching and con-

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\* Read before American Ophthalmological Society, July, 1902.

siderable pain, the paroxysms of the latter often lasting for many hours. Numerous ointments and lotions were employed without relief, but all operative treatment was refused.

The condition of the growth when I first saw it is shown in Fig 1. At this time there was an almost complete obliteration of the conjunctival sac from inflammatory adhesions, the eyeball was atrophic and there was an extension of the growth into the structures of the orbit, but to what depth could not be determined. The itching was intense and the pain would often continue throughout a whole day. Examination of the growth showed it to be a squamous cell epithelioma. After a lead mask had been prepared to protect the face and the sound eye from the action of the rays, treatment was commenced on February 15 and continued daily for periods ranging from five to ten minutes for two weeks, when it was given every second day for one month, and then every third or fourth day for two weeks more. Within a week after the beginning of the treatment there was a decided diminution in the severity of the pain, the discharge was lessened and the area had a healthier appearance. At the end of the third week the size of the growth had diminished slightly, healthy granulations appearing at the edges. The improvement continued, and on April 5 the nasal portion had entirely skinned over, and the palpebral and orbital disease showed decided diminution in size. The picture, Fig. 2, was taken at this time, after a total of 36 exposures.

On April 14 she returned to her home, and the treatment has since been continued by Dr. Goff on an average of three times a week, directed to the diseased tissue of the orbit. The improvement has continued, but the refusal of the patient to permit enucleation of the atrophic eyeball has rendered it difficult to reach all the diseased tissue with the rays.

*Case 2.* Thomas M., aged 71, was sent to me February 28 by Dr. C. A. Oliver, with the history of a growth of the lower lid of the right side, close to the external canthus, which started 11 years before as a small ulcer. Under the use of ointments the ulcer healed and gave no trouble for

several years. In August, 1900, the disease recurred and continued to spread, notwithstanding all forms of local treatment. The growth was found to be epithelioma. Its appearance at the first examination is shown in Fig. 3. As the man lived some distance from the city the X-Ray exposures could only be given every fifth or sixth day, and extended over a period of four months, 22 treatments in all being given, with the result as shown in Fig. 4.

*Case 3.* James M., aged 64. Came to me from Dr. C. A. Oliver with a narrow ulceration on the edge of the lower lid of the left eye, near the internal canthus, which had existed for a number of years. No section of the growth was secured, but it had the appearance of epithelioma. After ten treatments, extending over a period of five weeks, there was complete healing of the ulcerated area.

The action of the X-Rays in relieving malignant growths has not as yet been satisfactorily explained. All operators recognize a destructive action of the rays upon embryonic cells, without, however, affecting normal healthy tissue, except under prolonged exposures; but the reason for this selective action remains to be determined. The sections made from a piece of the diseased tissue taken from Case 1, after a number of applications of the rays, and examined in the laboratories of the Jefferson Medical College, showed intense infiltration of leukocytes, although there was at that time subsidence of the early inflammatory symptoms. Over 90% of the cells were polymorphonuclear leukocytes, which were conspicuous in the cancer areas, around the bloodvessels, and in the bloodvessel walls, and as intravascular marginal collections. The epithelial cells showed evident degeneration, the chromatin being fragmented at the periphery of the nucleus, and appearing as fine irregular granules, with reduced intensity of stain reaction.

While leukocytosis may be a causative factor in the cure, the prompt relief of the pain and the fact that the ulcerated area loses its sensitiveness to touch indicates that some trophic change takes place under the influence of the rays. This may be secondary to changes of degeneration in the finer nerve filaments, resulting in decreased vitality and ultimate destruction of the cells of the diseased tissue. That the



X-Rays have a pronounced action upon the nerve structures is seen in the loss of sensation of healthy skin, following too long or too frequent exposures, while as regards the cancerous tissue, large portions may be excised without pain after the part has been subject to the action of the rays for several days.

In employing this method of treatment the healthy tissues are protected from the action of the rays by heavy sheets of tin foil, or by a sheet of lead, about 0.3 mm. in thickness, having an opening corresponding to the size of the diseased area. A tube of low vacuum gives more rapid results than one of high penetration, and should be placed from 6 to 10 inches distant from the part. The exposures vary from 5 to 10 minutes. The closer the tube is to the disease, the more powerful is the effect. Care must be taken not to burn the tissues seriously, a result that may readily follow exposures that are prolonged, too frequent, or with the tube too close. This burning does not usually appear until a week or ten days after any given exposure to the rays.

There is probably no portion of the body in which the value of the rays will be greater than in the surgery of the face, particularly of the eyelids. Their employment will render unnecessary the extensive plastic operations, with disfigurements of the face, which are now required to cover the area after the disease is removed. Even the new tissue that replaces the disease after the X-Ray treatment differs from ordinary scar tissue, having more nearly the appearance of normal skin, and being more pliable and not so liable to contract.

The most uniform results have been secured in the treatment of epithelioma and lupus, although the rays are of value in other neoplasms. Sufficient time, however, has not elapsed since the discovery of the method of treatment to indicate the permanency of the results. I believe that when the treatment is carried out properly and continued for a short time after healing has occurred the disease will not return. Even if there is recurrence, exposure to the rays may be renewed, with results equal if not superior to what may be secured by the secondary operations.—*Reprinted from the American Medicine.*

COMMENTS.

Our readers are familiar with the work of the writer of the paper. He was among the first to demonstrate that the location of foreign bodies in the eye could be determined with exactness by means of the X-ray. It is gratifying that he finds the X-ray of value for therapeutic as well as for diagnostic purposes.



ELECTROTHERAPEUTICS AND QUACKERY.

"At the first annual meeting of the British Electrotherapeutic Society, Mr. Edmund Owen delivered an address in which he deplored the lack of proper recognition of the treatment of diseases by electricity, on the part of the medical profession, and attributed to that cause the fact that the medical use of electricity had fallen largely into the hands of quacks. While we cannot agree with Mr. Owen as to cause and effect, our inclination being rather to reverse the order, we heartily concur with him in that the practice of electrical therapeutics is largely in the control of those whose consciences are somewhat blunted and those whose enthusiasm conjures up at times strange dreams. The fact that there are scarcely a handful of reputable authorities in the world to-day who have any faith in or knowledge of the therapeutics of the static form of electrical manifestation, and that there are hordes of users of this method whose voicings betray their ignorance of even the elements of electrophysics, is significant

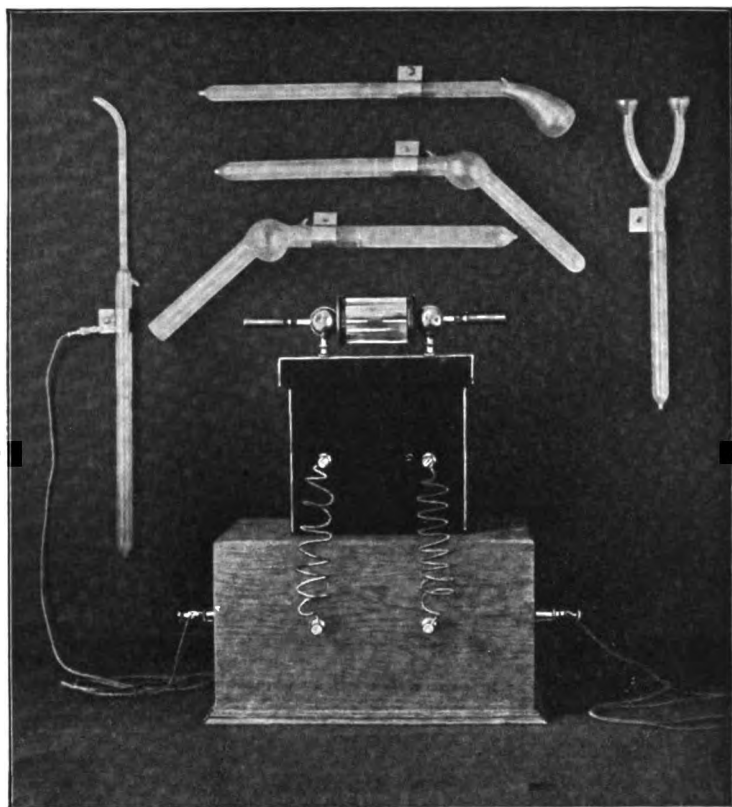
at least. Turning to so-called galvanic electricity, which has been somewhat explored by able and reputable scholars and put upon a comprehensible basis, we find one recent writer speaking of 'a boil that a surgeon had opened, and then the germs got in and the trouble began.' He 'placed a needle in the boil and turned on about two and one-half milliamperes of *negative electricity*," and the cure was speedy, etc., while others are reporting cures of every ailment from chilblains to cancer, and reporting the same with the most ingenuous disregard for the accepted theories of electricity.

"The wide-spread employment of the Roentgen ray will do more to bring about a dissemination, if not a deeply grounded knowledge, of apparatus and electric manifestation and effect upon the human system than anything that has occurred for many years."

Comments: The above is taken from an editorial in the New York Medical Record. It shows how careful the electro-therapeutist must be to state his results in scientific language. Any one reading the papers in this and other journals can see that there is a considerable body of careful operators who are not unduly optimistic and who are using electricity in as scientific a manner as any therapeutic agent is now used.



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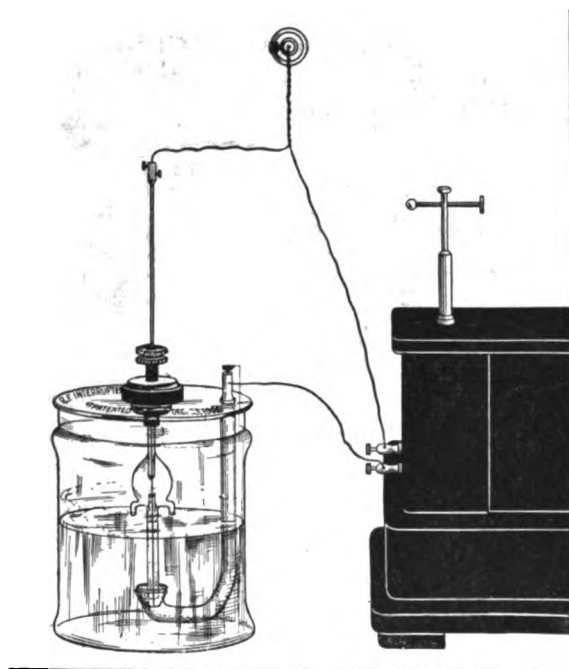
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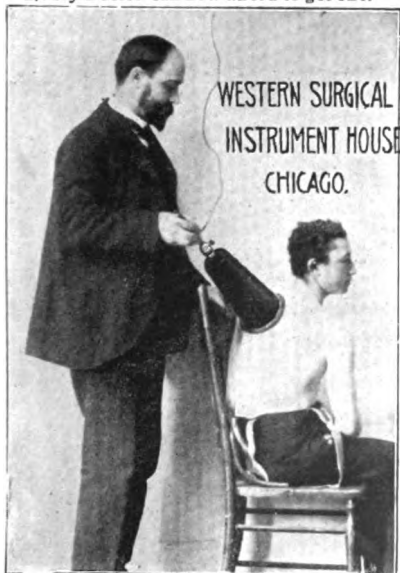
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## Original Contributions.

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### ELECTROLYSIS IN ITS RELATION TO SCAR TISSUE CONSTITUTING URETHRAL AND OTHER STRICTURES.\*

By A. Augustus O'Neill, Ph. D., M. D., Columbus Hospital, Chicago Ill.

By failure and disgrace, condemned to the slum,  
By fortune now enriched, back they all come.—*Anon.*

The recent advances in electro-therapeutics, made possible by the marvelous discovery of Professor Roentgen, Crooks and others in the X-Ray, has made another and perhaps one of the most important epochs in electro-therapy, and furnishes the profession with therapeutical aids of inestimable value and has attracted the attention of the professional as well as the non-professional world and given a new and second impetus to other departments of electro-therapeutics which have fallen into partial disuse and obscurity. I am sorry to notice, however, that this revival brings the subject forward hampered with the same barnacles which had impeded its progress in the past, and placed the whole subject in disrepute.

The subject of electrolysis in its relation to cicatricial tissue is one which for myself I settled years ago, having given it considerable attention and arrived at my conclusions after considerable experience and research. Electrolysis may be de-

\*Read before the Chicago Electro-Medical Society June 30, '03

defined as a certain use of electricity to bring about certain electro-chemical changes in fluids, semi-fluid and solid bodies known as electro-chemical decomposition or dissolution. Electrolysis of organic or living tissues comprehends several physical processes, and it would be impossible in the scope of this essay to enter into the minute considerations which the importance of the subject would warrant, so we will this evening confine ourselves to the practical application of electrolysis to living tissue, but particularly to cicatricial tissue.

As electrolysis is the decomposition of compound bodies by electrical force, the same is applicable to living tissues by bringing the latter between the terminals of an electrical circuit. Then several changes and effects are produced (physiological-calorific-actinic-chemical); 1st. Dissolution of tissue within a certain area or limit (electrolysis proper). 2nd. Stimulation and irritation of tissue within certain limits (electrical stimulation). 3rd. The effects of mechanical-stretching—pressure and manipulation, produced with the electrode. 4th. Electrical osmosis (cataphoric action), entirely distinct from electrolysis.

We will consider each.

First, dissolution of tissue which takes place at and near contact points is the result of chemical galvano-caustic action; acid at the positive and alkali at the negative pole, The chemical action of these products upon the tissues and the destruction of the tissues from whence derived destroying their integrity, results in decomposition (electrolysis).

A secondary action, purely chemical and depending upon the metal of which the electrode is composed, the electrode being acted upon by the current as well as the results of tissue decomposition and this reacting again upon the tissues.

Second, stimulation and irritation of tissue, with its consequent hyperæmia and hypertrophy; physiological or pathological.

Third, effects of manipulation produced on tissues by electrodes, as stretching, etc., as in introduction of olives, sounds, etc., into the urethra, producing certain definite effects—attenuation, absorption, stretching.

Fourth, electrical osmosis, entirely distinct from, but ac-

companying electrolysis; when a current passes through living structures. "The emigration of the Ions is accompanied by a transfer of the fluid *en masse*." The degree of electrical osmosis is proportionate to the resistance of the fluid body. The direction of the osmosis is always from positive to negative. "Electrical osmosis is very marked in the case of pure water and diminished when the conductivity is imparted to the liquid by the addition of salts in solution." This is a most important consideration, as by it may be explained many tissue changes called obscure yet far reaching in their effects. The composition of the body offers about the same resistance as a weak saline solution to the electrical current, that is, offers enormous resistance, so that in all electrical currents passing through living tissues there is an active transportation of the water to the cathode. With this thought well in mind, let us briefly look at the composition of living tissue.

Under the influence of heat and light, as if with Divine touch, comes forth from the seeming dead or sleeping inorganic world that which constitutes the substratum of the animal organism, namely proteid, brought to us by the vegetable kingdom, an indispensable constituent of every living animal tissue and an essential for the manifestation of animal activity—proteids composed of non-crystallizable compounds, of hydrogen, oxygen, nitrogen, and sulphur, the combination or conversion of which into proteid is the secret of the vegetable world. "Our very conception of a living, functionally active cell, whether vegetable or animal, is necessarily associated with the integrity of its protoplasm, of which the invariable organic constituents are proteids."—Prof. Gangue. "The property of converting the proteids into living tissue belongs to the animal organism." Anything which interferes with the integrity of the animal cell limits or destroys its power of segmentation or reproduction, and we can easily comprehend that any considerable movement of the fluid in the living tissue toward the negative pole would so disturb the constructive metabolism as to impair nutrition, bringing about atrophy or degeneration of tissue so acted upon. If this transportation of fluid is not great, and the fluid balance of the cell contents is not much disturbed, restoration of the fluid balance within the tissues can and will take place within a certain time. The power

of such restoration or recuperation differs in different structures,—pathological structures, less highly organized than normal tissues and having a lower power of recuperation, are less fitted to withstand the disturbances caused by the effects of the electrical current. From this view was born the idea of carrying off cicatricial and connective tissue, and especially the tissues constituting strictures of the urethra, rectum, the cervix uteri and other canals, without interfering with the normal tissues adjacent as mucous membranes or epithelial coverings. Beautiful theory, which would enable us, should we close our eyes and give line to our imagination, to see the stricture dissolve and be destroyed and the electrical lines of force attacking these connective tissue accumulations to the exclusion of the normal structures with the same certainty and discrimination as the wasps were supposed to drive out all the Canaanites from the land of Canaan; and I would not be inclined to disturb so pleasant a dream by converting it into either a nightmare or a rude and abrupt awakening, if the carrying out of this beautiful dream were not attended with many dangers, fraught with many accidents resulting in some most deplorable physical disabilities, ruining the comfort, health and even the lives of many individuals—and for these slight reasons I dare disturb this dream and put an end to the Quixotic ripping of our wine-bags open under the delusion of killing giants.

When important and dangerous procedures are recommended to the profession by men of experience (and none others should make such recommendations), we assume the great responsibility of the effect of such procedures upon the health of humans, he should be careful in his observation, able to make proper diagnosis and to attribute effects to their proper cause. Nothing can be more reprehensible and condemnable than to recommend dangerous procedures on purely theoretical points, arriving at definite conclusions from unsound and indefinite speculations—procedures which may imperil the comfort, health and even the life of patients in the hands of the inexperienced practitioners who, perhaps, allow themselves to be guided by such recommendations. The great fault and dissatisfaction in the field of electro-therapeutics has been that in dealing with electricity in its application to disease we have

made the theologian's mistake of depending upon deductive and speculative philosophy and from conjectures thus formed arrive at conclusions which are made the working rule and basis, notwithstanding the contradictions of the facts and results of carefully conducted experiments along the sound basis of scientific demonstration.

Our greatest benefits have proceeded from dissectors, not dreamers. To refuse to dream is to refuse to work with part of our senses when we are privileged to use all. To close our eyes and depend upon "that something peculiar to each individual case, which we feel" and not watch the milliamperemeter and the results of electricity on these scar tissues, is to dream and delude ourselves. It is beautiful to dream; it is better to progress, and progress with firm and steady tread.

I fear I am encroaching upon your valuable time and indulging in persiflage beyond the privileges of this important subject; so to the issue.

All results are definite effects of definite causes. We have currents of known qualities and quantities, instruments of precision by which we may know beyond conjecture the strength and quantity of electrical currents, and we have tissues of known pathology and physiology and an approximate knowledge of its physical properties, save that something referred to as "vital principle." For our consideration we have to take into account cicatricial tissue constituting urethral and other strictures.

Cicatricial tissue, as we all know, is formed from granulation tissue, and granulation tissue always results and is produced to supply the place of normal tissue which has been destroyed by any of the various processes as well as replacing regions of its own tissue which may have been destroyed by inflammatory or other destructive processes. It is a shining, smooth surface-tissue of light color—connective tissue in type. The abundant blood-vessels which so richly supply the granulation tissue, largely disappear as this forms connective tissue, so that the latter is not so abundantly vascular as normal tissue and also lacks the nervous and lymphatic structures. The one great peculiarity of connective tissue which concerns us is that it finally contracts in all directions and dimensions, increasing in



density with a transforming tendency mimicking the structure it has replaced in some cases. In areas of not great dimension it is found invested with an epithelial layer forming a horny surface. From this it may be seen that it is less resistant to destructive agents than normal tissue, yet, like normal tissues, has the power of regeneration of itself in part, and if all should be destroyed, the normal processes of repair would again fill in the gap with a new supply of granulation tissue to become connective tissue; and this after the process of sloughing off of the necrosis produced by the agent which destroyed the first crop, and, sorry to say, the second crop, is apt to be larger to meet the larger demand, should some normal tissue surrounding the first lot be included in the destruction.

From the foregoing reasoning in the first part of my discourse on the qualities and effects of the electrical current, it may be seen that in its effects upon living tissues electricity cannot be more than a destructive agent nor less than a tissue stimulator or irritator, and between these extremities, or with the extremes, we endeavor to produce the results we call good.

The question of electrolysis is an old one. As early as 1803 Mongiordo and Landom<sup>1</sup> called attention to it, and shortly afterwards Fabre-Palaprat.

In 1841 Crusell<sup>2</sup> of St. Petersburg, in an address to the French Academy of Sciences, advocated dissolving urethral strictures with the alkaline pole without producing scars, and again, in 1849, a committee of the academy to whom his paper was referred reported adversely to his claims. Crusell became discouraged. Lerche followed, in 1849, with Crusell's method and discovered atonic ulcers would heal under the stimulation of a voltaic couple on their surface; by Graefe<sup>3</sup>, in 1852; by Ciniselli, in 1860; so we can see that the oft-made claims by Dr. Robert Newman and his adherents, as being the originator and the first to suggest electrolysis for strictures, are unfounded. The subject was old and well thrashed before Newman dreamed of it.

In the treatment of urethral stricture, mainly two statements or procedures are urged: First, carry off the stricture without impairing its epithelial cover or the epithelial portion of the urethra by that inscrutable and mysterious principle which some electro-therapists cannot name or mention, but can

close their eyes and realize it; second, to carry off the stricture by electrolysis, using such currents as will dissolve the cicatricial tissue and not impair the normal tissue surrounding it, and to do it in such a way that no more connective tissue takes place and no more return or recontraction of the stricture. Good.

In the two foregoing recommendations, while there is a diversity of opinion regarding the *modus operandi*, both seem agreed as to the rule which has become eminent—so eminent that there is vieing for its authorship—the celebrated rule to be remembered by the five fingers on the hand: Three fives, five minutes, five milliamperes, and every five days—three fives which will not make a “full house,” but, I suspicion, may make a full hospital.

Will it remove a stricture to stay removed? Has it removed a stricture in the sense we understand stricture, and that removal by means of electricity? No!

I have had an experience covering several hundred cases of different kinds of stricture in different degrees of formation, and make the statement now, that where we have an organized cicatricial stricture, the currents of sufficient strength produced electro-chemical destruction, necessitating nature to replace such destruction with scar tissue. If an ordinary olive bulb be applied with currents of two, three or five milliamperes, for more than two or three minutes, not mentioning the long applications of the same current strength recommended by some operators, they will produce gross destruction of the tissues in contact. I will not simply cite the results in patients, but will detail experiments made with care and accuracy concerning definite currents applied to definite areas.

#### EXPERIMENTS.

Experiment I. Four milliamperes applied for five minutes to scar tissue, 13 years old, on the thigh. Result: Destruction of scar tissue and burn. Area,  $1 \times \frac{3}{4}$  cm.

Present result, 8 days after: Regular process of cicatrization with inflammatory reaction; new granulation tissue taking place of the old.

Experiment II. Four milliamperes, 5 minutes, to similar structure on the thigh. Scar tissue, 19 years old. Result:

Same as preceding.

Experiment III. Two milliamperes, 3 minutes, to buccal mucous membrane; area,  $1 \times \frac{3}{4}$  cm. Result: Mucous membrane whitened and roughened with necrosis appearance; sloughed off next day, reparative process requiring four days, membrane showing effects of destroyed epithelium, seven days.

Experiment IV. Two milliamperes, 3 minutes, positive electrode to same size area. Result: Destruction of epithelium, with blanching of mucous membrane for five days.

Experiment V. Platinum wire electrode, 1 cm. No. 18 wire, 2 milliamperes, 3 minutes, to scar tissue on thigh, 13 years old. Result: Characteristic electrolysis or galvano-caustic tissue destruction.

Experiment VI. Ten milliamperes, 10 minutes, on skin of rabbit, copper electrode. Circular area of contact, 1 cm. diameter. Result: A very bad burn, with considerable tissue destruction.

Experiment VII. Same size area as preceding, on surface of bladder; positive contact; copper, 10 milliamperes, 3 minutes. Result: Destruction of peritoneal covering of bladder.

By the preceding experiments it may be seen that very slight currents for a short duration of time may destroy the epithelial linings of the different cavities, and from this observation, with our present knowledge of the modes of tissue-resistance of pathogenic bacteria may be seen the danger. It is not necessary to call attention to the necessity of using instruments which have been sterilized and to handle them with aseptic precautions; this necessity is too well known, but I wish to call attention to the fact that clean instruments are not the only desideratum in the prevention of infectious inflammations. On the mucous membrane even of normally healthy individuals may be found many varieties of pathogenic micro-organisms with no injurious effects, provided the mucous membranes and their epithelial covering are intact. Lustgarten and Mannabey made bacteriological examinations of the urethra of eight healthy males and found ten different kinds of micro-organisms and among them a number that are known to produce cystitis, and when this is true of healthy individuals, how much greater is the danger in individuals subjected to infectious inflammations in the past with, in all probability, abundant viru-

lent micro-organisms now latent by nature's fortifications, should we destroy or lower the integrity of the mucous membranes or epithelium and thus produce atrium for infection. The question is answered daily in our hospital and private practice. Thousands of lives are lost annually from the remote consequences of catheterization. (Senn Surgery, 1902.) The same is true of the cervix uteri and rectum. A case in point: Young married woman, aged 22, nullipara; came to me a month ago in a deplorable condition. She had been subjected to electrical applications to the cervix uteri in an effort to relieve antelexion. After the third application she was seized with great pain, followed by pelvic inflammation, causing right pyosalpingitis. Was confined for weeks in one of our hospitals and is now an invalid and will probably never regain her former good health without a mutilating operation for the removal of the right tube and ovary, or even with that doubtful expedient. It is possible that the instrument used was perfectly aseptic, but was the cervix uteri or vagina so at the first application, much less so at the second application, when the mucous membrane damaged by the former application was in the struggle of repair, within all probability, an infected scar to be further injured and extended by a second and a third application. I might enumerate a number of such cases, but time will not permit. Urethral inflammations are common consequences of instrumentation, even in intelligent hands, but especially following electrical applications carried on to the extent of destroying the epithelial membrane (and mild currents of short duration will destroy the epithelium).

#### CASES.

Case 1. Male, aet. 48. Architect. Perfectly healthy, excepting a feeling of pressure in rectum; never had any contagious urinary disease; could pass urine without effort or pain; consulted one of our most intelligent and leading practitioners; was subjected to the urethral bulbous bougie; current of unknown strength; hoping to relieve congested prostate, which was beginning to show evidences of senility; was immediately seized with intense inflammation; was confined to his bed in a most critical condition, from which he never recovered and is now, and has ever since been, leading a catheter

life. In this case I also think the instrument was sterile, but the micro-organisms resident in the urethra became capable of setting up an acute inflammation of bladder, urethra and prostate by an injury to epithelium and mucous membrane, as emphasized by Raymond.

(Ann. des Mal des Organes Genito-Urinaries. P. 253—1893.)

Case 2. Mr. O., young man, aet. 26, about to be married. Had gonorrhea six years previously, with resulting stricture. Has had no discharge for years. Subjected to electrolysis  $2\frac{1}{2}$  m. a. less than three minutes. Violent inflammation following within 48 hours, with typical discharge and an accompanying epididymitis. When he recovered from this attack I made an internal urethrotomy. No trouble since.

Case 3. Mr. J., Board of Trade member; was treated by a practitioner of ability, who used the ordinary sound, but by mistake turned on the positive current. By either surprise or thoughtlessness he used force in withdrawing the sound, and brought with it the mucosa of almost the entire urethra, not remembering that he might have reversed the current and thus freed the electrode. Multiple extensive stricture resulted; treated for a long time with negative current and result.

Case 4. Mr. A., double stricture of the urethra; had been treated for more than two years with electricity by two different physicians. No result. I made an internal urethrotomy of the stricture in the pendulous urethra and divulsion of posterior. Urethra retains caliber No. 32 F one year after.

Case 5. Miss S., treated with electricity for more than three years, off and on, for menorrhagia. Very dense cervical stricture resulted with consequent uteralgia. I performed hysterectomy and found the cervical endometrium destroyed and dense cicatricial tissue in its place.

Case 6. Miss B., treated for endocervicitis over a period of years, resulting in almost cervical obliteration. I performed hysterectomy and found substantially the same condition as in the preceding case.

Case 7. Mrs. S., treated for uterine fibroids extending above the umbilicus. Treatments continued over a period of years, in order to reduce size of the mass and possibly obviate operation. Mass reduced to about three times the size of the normal

uterus. A cystic tumor was uninfluenced by the treatment. Hysterectomy was performed on account of the great hemorrhages. On examination of the cervix I found it to be almost cartilaginous, so dense was the cicatrix.

Case 8. Mr. McC., treated for fully three years for urethral stricture. No result. Performed internal urethrotomy.

Case 9. Dr. T., urethral stricture. Planned to give electrical treatments. At the first treatment the contact of the electrode produced epileptic seizure while patient was on the operating table. Electrical treatments were of no avail. Internal urethrotomy performed. No epilepsy since.

Again the effects of electricity upon the canal of the cervix uteri is well established. A case of constantly occurring hemorrhage due to multiple myomats, subjected to aluminum electrode, positive current, 15 to 20 M. A., for 10 minutes; each sitting would stop the hemorrhage for a time, but recurred at almost each menstrual period, so that a great many applications were made from time to time for a period of six years, the lady fearing an operation. The hemorrhages became so distressing she finally decided to submit to an operation. I performed a hysteromyomectomy upon her and during the operation a small Syme's sound failed to enter the cervix, which was not dilatable, so dense the scar tissue. On section of the uterus, a hard mass almost cartilaginous constituted the cervical canal with complete destruction of the mucous membrane and some of the muscular structure, notwithstanding that in no case did the current exceed 20 m. a. I have operated upon three similar cases during the past year and present for your inspection some of the specimens. I understand, of course, that stricture of cervix is unavoidable. In treatment of uterine fibroids when proper currents are being used and would not urge it as a great objection, but simply cite these cases as illustrative of stricture produced by electrolysis, but in the later cases the question of infection following these applications is perhaps the most to be feared, and that notwithstanding that sterile instruments are used. A case of uterine myomata subjected to electrical application became inflamed, the patient narrowly escaping with her life. Patient brought to me from a distance by her physician. Examination of the discharge by Dr. Zeit revealed abundant staphylococci. When

the acute symptoms abated I removed the uterus and myomata, and now exhibit this large mass. I can cite other instances which would occupy too much time. From the foregoing it may be seen that mild currents which will not destroy the mucous membrane will not eradicate the stricture, either of urethra, cervix uteri or rectum, and in every case where scar tissue has been melted down by electrolysis such removal has invariably been, and must be, replaced with scar tissue. The brazen statements made of total removal of scar tissue, not to be followed by scar tissue, to say the least, shows a lack of intelligence. One LeForte claimed to remove rectal stricture by applying the galvanic current per rectal electrode over night—think of it! (*Gaz. des Hospitaux*, Paris, 1873; p. 221.) Dr. Newman of New York reports nine cures out of twelve otherwise incurable cases, and in one, upon whom he made an autopsy years after, found not the slightest evidences of stricture nor scar tissue. (Tuttle, *Diseases Rectum*, 1902.) Dr. Tuttle, commenting upon these cases, repudiates the claim. Now let us be honest—did Dr. Newman ever see such a case? I say, most emphatically, no. Nor anybody else; and the most charitable construction of his report is that he may be excused on a lack of pathological knowledge. Such statements are as dangerous and misleading as they are disappointing. We can easily put the test by using the currents of the same strength, 5 to 20 M. A., the same duration of time and same distribution of electrodes, and satisfy ourselves as to the soundness of such statements.

#### CONCLUSIONS.

- (1) Electrolysis, when applied in current strength which will not injure the mucous membrane and epithelium, will not dissolve a stricture.
- (2) Currents sufficiently active to carry away scar tissue do so by destruction of scar tissue to be replaced with scar tissue.
- (3) Weak currents will temporarily dilate a stricture, and this more readily than by mechanical dilation, and such may be accomplished without injuring the mucous membrane, provided very weak currents are used.
- (4) Electro-cautery incisions are equivalent in every particular to internal urethrotomy, excepting that the scar must

slough off before healthy granulation can take place, and are applicable to limited number of cases as a procedure of preference; but the incision, whether electro-cautery or knife, will heal by granulation (scar tissue) tissue, substituting a stricture of larger caliber for a smaller one.

(5) Inflammatory conditions can follow even with sterilized instruments any current of sufficient strength to impair the epithelial lining or mucous membrane, thereby creating an atrium for infection, the pathogenic micro-organisms being almost omnipresent.

(6) Scar tissue cannot be removed or absorbed by electricity in such a way as not to be followed by scar tissue.

I am conscious that there is a seeming positiveness in my statements regarding electrolysis in the treatment of urethral and other strictures, and I am intentionally and carefully positive; my only desire is to place electro-therapy on a sound basis and in no way wish to ignore or decry the many efforts of workers in this field, barren in result though many may have been, nor to insinuate a lack of scientific knowledge in men with mistaken conclusions, remembering that—

“Without genius learning soars in vain;

And without learning sinks again;

Their force united crowns the sprightly reign.”

Nor would I use the criticism of malevolence with a torch of infernal luster, whose rays fall only on faults.

“No light, but rather darkness visible,

Seemed only to discover sights of woe.”

Electrolysis is a most valuable therapeutic means in numberless ways and conditions and I simply emphasize the dangers that they may be avoided, recommend its virtues within proper limits, and I hope in the near future to have the honor to present a paper on the uses of electrolysis.

“Our bane and physic the same earth bestows,

And near the noisome nettle blooms the rose.”

#### DISCUSSION.

Dr. Prescott said that in passing even sterile instruments through the urethra there was considerable danger of carrying the infection into the upper parts of the canal, because the lacunæ are the favorite haunts of micro-organisms, and when



these are dislodged by the sound and carried to the bladder, cystitis would be produced. The presence of these bacteria is almost invariable in case of stricture, because this condition results from a gonorrheal infection. He had therefore found it advantageous to thoroughly wash out the urethra and bladder with a potassium permanganate solution for passing the sound.

Mr. Treadwell said that he was much interested in Dr. O'Neill's experiments because he acted as a subject in experiment No. 1. The indicated electrodes were applied to a longitudinal scar on his thigh. The skin was thoroughly washed with soap and water and was afterwards wet with alcohol to make the resistance as small as possible. Dr. O'Neill's largest aluminum sound was used and though the milliamperage was small—that is, less than 5—the electrodes felt much like a hot iron producing considerable local reaction at once. Even after six weeks the scar is reddish brown where the electrode was applied. He was so well convinced by his reading that large currents could be administered upon mucous membranes from electrodes of small area, that Dr. O'Neill consented to make experiments 3 and 4, although the doctor was perfectly satisfied that the mucous membrane would not tolerate large currents. In order to avoid the electro-cautery of a small electrode an olive bulb of the largest size, was used. The bulb was placed firmly against the mucous lining of the cheek and great care was taken to prevent dispersion of the current by the saliva. Although the current was limited to three milliamperes and was administered less than 5 minutes, the mucous membrane was blanched and roughened and sloughed off the next day. There was, however, no infection, and therefore no considerable amount of irritation. This was altogether different from what one would expect by the recommendations of administering large currents as advocated in the books on Electro-Therapeutics. Neither the positive nor negative electrode adhered to the membrane. In both cases the electrode felt hot and the treatment would have been unbearable with 5 milliamperes. The area of contact was always large—namely, equal to the plantar surface of last phalanx of the little finger. In view of this fact it would seem that applications over a smaller

area in the urethra must produce even greater irritation, and because of the numerous reports of only slight irritation with larger currents, he wondered whether the mucous membrane of the mouth were not more sensitive than the membranes of the urethra or rectum.

He had just received Rockwell's treatise on Electro-Therapeutics and had noticed the judicious and conservative tone of the author in many departments of the subject. In no place was this more marked than in the author's treatment of stricture. In this disease the author does not recommend the galvanic current, for after a thorough trial he found the results were unsatisfactory. He detailed a case treated under the superintendence of Dr. L. Bolton Bangs, the eminent authority in genito-urinary surgery. The treatments were carried out carefully and persistently, but there was no effect on the size of the stricture. Dr. Bangs subsequently performed external and internal urethrotomy with the final result of the easy passage of a No. 26 F sound. Dr. E. L. Keyes also tried the method recommended by Dr. Newman on eight cases, and gives the following conclusions:

"My study of the subject and the experience it had brought me, digested with all the impartiality I possess, leave me to state that the allegation that electricity, however employed, is able to remove organic urethral stricture radically lacks the requirements of demonstration."

Dr. Burdick said that there is no doubt that a 5-milliampere current would destroy both cicatricial tissue and the epithelial lining of the urethra in contact with the electrode. In his paper before the society he recommended the galvanic current applied by a blunt-pointed knife platinum electrode of the olive type, to cut the annular stricture without pain, and the patient would not need to go to bed. To be sure, it would be necessary to dilate the urethra after this cut, and the result would be the same as in urethrotomy—namely, the substitution of a stricture of larger caliber for a small. This dilation could be accomplished at one sitting. He had not found in any of his cases a violent reaction noted by some operators. He certainly did not mean to suggest that the stricture would be absorbed. He always boiled his instruments in order to thoroughly

sterilize them, having a special apparatus which he bought early in his practice, and he thoroughly cleansed the urethra with an application of peroxide of hydrogen and glycerine for several days before the sitting wherever possible. He had known of several cases of infection produced by the passage of the sound where the only attempt at sterilization was wiping the instruments with a towel. Disastrous results might well be expected of such cases. Since the reading of his paper he had treated two cases of stricture, in which the dilation desired was obtained in periods respectively of one hour and a half to two hours and a half. It must also be admitted that there would be a gradual contraction of scar tissue in the enlarged stricture and this must be foreseen at the time of the first dilation.

Another case was a doctor's wife, having uterine fibroid tumor. Her heart was in such poor condition that she could not take an anesthetic. It was very difficult to control the hemorrhages at the time of the menstrual period. He used the platinum intra-uterine electrode every month for six years, and sometimes two or three times during the month. There was no operation for the fibroid tumor and now, after the menopause, the patient is all right and the fibroid is certainly not larger than when the treatment was first instituted.

He had found that with a large pad covering the abdomen for the different electrodes, he could administer 35 or 40 milliamperes without causing any local reaction. Dr. O'Neill's experience is certainly more extensive than his, but he could not account for the negative results. When copper electrodes are used, ulcers are sometimes formed on mucous membrane, which are difficult to heal, and which leave considerable induration after cicatrization has taken place.

Dr. O'Neill, in closing, said that the infected cases reported were treated, with one exception, by other men of recognized ability; his results were, therefore, no poorer than those of the great majority of careful observers, and the infection certainly could not be laid to lack of surgical cleanliness, for he had performed thirty-four hysteromyomectomies during the past year without the death of the patient or infection.

Replying to Dr. Burdick's statement that he boiled all his instruments, Dr. O'Neill called attention to Dr. Burdick's last

paper before the society, in which he said that the instruments could not be boiled without damaging the insulating material and that he therefore kept them in a solution of formaldehyde. Dr. O'Neill said that he sterilized his instruments with formaldehyde, but that this must be washed off before the instrument is applied to mucous membrane. Ordinary tap water is loaded with germs and is therefore unfit. It was his custom, therefore, to momentarily immerse the electrode in a vessel of boiling water and then allow the instrument to cool just before inserting into the urethra.

But even these precautions are not sufficient, for the best bacteriologists and pathologists agree that the urethral membrane is loaded with bacteria and the abrasion of this membrane by electrolysis will create an atrium for infection. Notwithstanding the fact that only a few cases are thus infected, he felt that these few were enough to condemn the use of the current.

He had applied 10 milliamperes to the urethra for a short time without causing much pain to the patient, and although there was without doubt a superficial destruction of the mucous surface, no serious infection resulted and the patient was not obliged to go to bed. But this result was not because the instrument was aseptic, or due to the skill of the operator, but this was simply one of the few cases with no resident urethral micro-organisms.

Dr. O'Neill never uses the copper electrode, but always aluminum, nickel-plated or platinum.

The mucous membrane in the mouth is not different from that found in the urethra in its reaction to the current. Mucous surfaces in all parts of the body will present similar reaction to the current.

The statements read from Rockwell's treatise on Electro-Therapeutics bore out his experience. Dr. Bangs is conceded to be of the highest authority in genito-urinary surgery. He certainly gave Dr. Newman's method a fair trial.

LaForte was the first one to recommend the linear cautery electrode, and Dr. O'Neill recognized that it might be of value in a few cases where an operation was impracticable, but the patient should be warned of the risk incurred.

Regarding the application of galvanism to fibroids, he said

that even if the electro-therapeutist was able to carry the patient to the menopause without any great increase in the size of the tumor, it was no indication that the neoplasm would not take on great activity at a later time when operation would be difficult. In a few cases the galvanic current might be of value when used but a short time before operations, in limiting the infiltration of connective tissue, but the operation should not be indefinitely postponed unless the case were an inoperable one, as these neoplasms frequently undergo malignant transformation after the menopause, and it must be remembered that only a small minority remain quiescent or diminish after the menopause.

## REFERENCES.

- <sup>1</sup>Traite d' Électricité et du Magnetism. Tome III. Bequerel.
- <sup>2</sup>Crusell, Ztg. des Med. Vereins 1841.
- <sup>3</sup>Graefe, Deutsche Klinik, 1852.



## A CASE OF SCIRRHUS OF THE BREAST\*

Reported by Elmer E. Prescott, M. D.

Mr. President and Members of the Society:

I have been requested by members of this society to exhibit for your consideration this evening a case of scirrhus of the right breast—and for matter of convenience of introduction, I shall divide the exhibition into three portions. The prelude, the case in question, and the prologue.

\*Read Before the Chicago Electro-Medical Society, June 30, 1903.

The prelude pertains to this young man, Bartholamel H. I will briefly call your attention to his case by explaining that while he was looking down an elevator shaft, resting his neck upon a piece of 4x4, and while he was in this position the counter weights of the elevator shaft struck him, striking him on the back of the head, producing a compound fracture of the back of the skull, just below the external occipital protuberance.

The fracture was transverse and linear in nature, being about two and one quarter inches long, and the same was not depressed when I found him. The scalp was torn from ear to ear and was also turned inside out over the man's face. The extent of the scalp injury you can see from the scars which still exist.

I also present to you in the same subject a compound fracture of the left lower jaw bone, a dislocation and fracture of the left collar bone and also call your attention to the scars around his throat and neck, extending from ear to ear in perpendicular lines, showing where all the flesh was torn from the anterior portion of the man's neck where it had come in contact with the 4x4 timber I described in the early part of my introduction.

In two weeks' time I had these wounds all healed, the stitches out and had all the dressings off, except that pertaining to the compound fracture of the jaw, which I was obliged to leave on for a period of four weeks in order to get a solid union.

I now introduce to you this evening the case in question, Mrs. A. H. I was not acquainted with this good lady until after the injury of her son, whose case I just exhibited to you. She came to me, stating that she had a cancer of the breast; that she had been to the Cook County hospital, the Presbyterian hospital, the Rush Medical college and the Mary Thompson hospital, and to about twenty private physicians and surgeons, who told her that her case had progressed so that it would be a crime to operate on her, as the cancer would only return with greater vigor and leave her in a more delicate condition than if no operation had been performed. She accordingly came to me with tears in her eyes with the above

history, asking me, if after I had done so much for her son, I could not do a little for herself.

I looked at the breast and I can assure you I had many misgivings, especially when you consider the oedema of the arm and forearm and hand and the continuous annoyance of numbness and prickling feeling of the hand and fingers, and if it had not been for the X-Ray at my immediate command, I would have done just what all my brother physicians, both in and out of our hospitals, had told her, viz.: Refused to operate.

I will show you first the scirrhus which I removed from her right breast, and call your attention to the retracted nipple that is so characteristic of this form of cancer.

I also call your attention and ask you to feel of the growth as I pass it around. You could easily detect the stone-like hardness of the mammary gland.

I also call your attention to the mass of axillary glands which I removed from the arm pit, and further direct your attention to the same hardness that you found in the mamma and the connecting mass of lymphatics that connects the mamma with the axillary glands. In removing this mass I made no attempt to remove the pectoral muscles from the chest, owing to the extensive infiltration of the cancer mass into these muscles—even extending down to the ribs—and ask you to kindly feel of the fifth and sixth ribs, and by comparing them with the corresponding ribs on the opposite side of the chest, you will notice at once the peculiar curling up of the two ribs, which is so peculiar to this form of cancer, when it has progressed to the extent that this cancer has.

The further personal history of the case is this:

Mrs. H. claims to be 53 years of age; married at 15 years; four children, all in perfect health; no history of miscarriages; never had any form of sickness outside of the regular infantile diseases that all children are heir to; but about two years ago she was struck, while doing some housework, by a board over the right breast, and after that there was a continuous history of tenderness over the breast, which increased until a nodular formed, which has terminated in the mass which I removed on the 15th day of March, and which I present for your consideration this evening.

The prologue, which I referred to in the early part of the history of this case, I will show you by asking Mrs. H. to remove her fascinator from her head, and you will at once see the immense depression left after removing an osteo-carcinoma.

I present to you at the same time a photograph of the woman an hour before the operation, and by comparing the two you can readily see the extensive operation that I was compelled to perform.

In conclusion I wish to state it is now about four months since the operation upon the breast and about eight weeks since the operation upon the head.

I want to call your attention to the even, smooth scar tissue; that we have no form of induration appearing in the site of any of the wounds, except a slight thickening in the axillary space, where, after I had removed the axillary glands, the closing of the arm against the chest has produced this cicatricial tissue and mass, it appears as a nodule, while in reality it is only a cluster of scar tissue.

You have heard the woman speak with her own lips and tell you that she has had no return of the pain since the operation, either in the breast or in the head, which she told you was continuous previous to the operation.

To remove the scirrhus from the breast, where the pectoral muscles are infected, as they were in this case, and leave them in place, knowing as I did from their firm adhesions to the ribs that if I attempted to remove them we would open the pleural cavity and bring on empyema and the countless other diseases that would terminate almost in immediate death, I think I am more than justified for that one reason alone in bringing the case before you.

It is early to say that there will be no return of the disease, but suppose there is—the four months of perfect quiet which I have given this good woman—the four months of perfect ease, the returning use of her arm and fingers; the odema rapidly disappearing from the arm and fingers. Is this woman not more than repaid for any chances that she has taken in the return of the disease after the operation, in consideration of all of the good results that have so far followed the operation? Could such an operation have been done five years ago.



previous to the introduction of the X-Ray in such cases? Is there a record of another operation of this character, which has been reported? If there is I am unable to find it and I will consider it a favor if any one will call my attention to such a case.

In final I wish to say that in treating this woman, immediately after the operation, that is, the next day, I drew her bed in front of the X-Ray and administered daily treatments right through the dressings, not waiting, as most of our surgeons do, after operations of this character, for reappearance of the disease before the application of the X-Ray. I kept up the daily treatments for a period of two weeks, using a medium tube and a static machine, the tube being about fourteen inches from the breast and the exposures ranging from three to eight minutes.

After the removal of the dressings I reduced the frequency of the application of the X-Ray to once in three or once in four days, and have so continued up to the present time.

I have occasionally produced a slight dermatitis over the breast, which has disappeared on the application of resin ointment.

On the back of the head, you will note that the hair has come out, but this will return, but if it did not, it would be a small consideration compared to the growth which I removed so successfully.

ELMER E. PRESCOTT, M. D.

110-112 Washington boulevard.

#### DISCUSSION.

To a question concerning the depth of the tumor in the occipital region, the reply was given that the tumor only penetrated through the dura mater and not to the convolutions of the brain.

Dr. Burdick said that the first case illustrated how hard it was to kill some people, and mentioned two accident cases which recovered though there seemed to be no hopes at first. Commenting on the case of carcinoma, he said that Dr. Prescott had evidently done all that was possible for the case, but that it was too early to make any positive statement. It was an exceedingly rare occurrence to have a metastatic nodule developed in the brain, and he would suggest that the tumor be

submitted to a competent pathologist to see whether it might not be luetic infection.

Dr. Prescott in closing said that there could be no doubt of the diagnosis of either tumor, and that he felt satisfied all progress of the disease had been checked by the X-Ray treatment. He would, however, follow up the X-Ray treatment for a considerable length of time and keep the patient under close surveillance. He felt confident that metastatic nodules could be controlled when discovered early enough.



#### EXPERIMENTS WITH A BLUE X-RAY TUBE.

R. Friedlander & Co. made a blue X-Ray tube for experimental purposes to determine whether any additional chemical or ultra-violet radiations could emanate from such a tube. The walls of the tube are of cobalt blue glass and the fluorescence of this tube is therefore not so brilliant as that of an ordinary X-Ray tube. There is a possibility that there may be a difference in the radiation emanating from this tube and my first experiment seems to indicate that the radiation from this tube is more powerful than from an ordinary tube of the same vacuum. Two tubes were connected in series; the blue tube and an ordinary tube of the same type. Each was enclosed in an R. F. Protective Shield with a diaphragm of equal size to allow equal cones of radiation to pass from the tubes. A piece of willemite, a silicate of zinc, was held alternately in front of the tubes. It fluoresced more brilliantly in the radiation from the blue tube than from the ordinary X-Ray tube. This radiation was evidently not ultra-violet because it could not be reflected with either a plain glass or concave mirror. It seemed to be the X-Ray because it passed through a book of three hundred pages and made the piece of willemite fluoresce. Very little fluorescence was produced from the ordinary glass tube, although the fluoroscope proved that the X-Ray penetrated the book. I am also taking a series of X-Ray pictures with the two tubes in series, but am not yet ready to report. The subject requires considerable research before any positive conclusions can be formulated.

C. H. TREADWELL, B. S.

## Editorial.

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I am happy to have the paper of Dr. O'Neill appear in the Journal and I coincide with his views, as I have met with the same bad results he refers to. It is high time for the Medical profession to come to some definite conclusion with reference to the use of the negative galvanic pole for the dissolving of strictures of the urethra. The compensation for the amount of time wasted in the course of treatment is altogether out of proportion to the benefit derived. Other means give better and quicker results.

WM. F. BUTTERMAN, M. D.

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### MINUTES OF THE JUNE MEETING OF THE CHICAGO ELECTRO-MEDICAL SOCIETY.

The meeting was called to order by the president, Dr. Gordon G. Burdick.

The reading of the minutes at that meeting were dispensed with.

Report of the treasurer was read.

The application of W. P. Coons for membership was favorably reported by the board of directors, and the report was ratified by the society.

Papers and Discussions:

First paper, by Dr. Elmer E. Prescott, exhibiting a case of carcinoma of the breast, removed surgically with involvement at the base of the skull some two months later. X-Ray exposures immediately followed the operation. Paper discussed by Dr. Burdick.

Second paper was given by Dr. A. Augustus O'Neill on "Electrolysis in Its Relation to Scar Tissue Constituting Urethral and Other Strictures." Paper discussed by Dr. Prescott, Mr. Treadwell and Dr. Burdick.

The society then adjourned until the 29th of September.

C. H. TREADWELL, Sec'y.

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## Abstracts and Reprints.

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### CLINICAL HISTORY OF TWO CASES OF EPITHELIOMA TREATED BY THE ROENTGEN RAY.

Reported by Henry Perkins Mosley, M. D., of New York City, in the *American Medicine*.

The apparatus used consisted of a ten-plate Waite and Bartlett static machine and a 50 cm. coil made by the Heinze Electric Co., of Boston, used with the Heinze liquid interrupter. The hospital supply of 110 volts direct current is used to run the motor for the static machine and is also used directly into the interrupter for the coil, for which no rheostat nor transformer is required. The areas have been usually at a distance of 15 to 30 cm. measured to the target of the tube. The surrounding tissues have been protected by lead foil. The time of exposure has been 5 to 10 minutes on alternate days. Occasionally more or less frequent exposures have been given, according to the case. When the coil was used a current of  $1\frac{1}{2}$  to 2 amperes was passed in the primary. Tubes of various makers have been tried and the most satisfactory results have been obtained with those tubes which give out a large number of rays which are not highly penetrating. It seems that the tubes of high vacuum cause dermatitis more readily than those of a low vacuum, but the curative effects do not seem to be so good with them in spite of the fact of their being able to influence so actively the healthy skin.

#### I.—EPITHELIOMA.

CASE I.—Epithelioma of the lip. The patient, Michael C., a laborer, aged 50, was born in Ireland.

*Family History.*—There is no cancer and no tuberculosis in the family. His father died in a famine in Ireland and his mother died of fever.

*Previous History.*—When 26 he had pleurisy for 6 months and has had two attacks since, the last 15 years ago. He

denies all venereal disease. He was formerly a hard drinker, but now uses only one pint of beer a day. He has smoked constantly a short clay pipe, which stuck to his lip but which, he says, did not get hot.

*Present Illness.*—Six years ago he “pulled skin off his lip” by its sticking to the pipe. It bled quite a little. He kept smoking and the area gradually increased in size. It has never healed and has bled considerably. Various ointments and applications have been used. He tried smoking on the other side of the mouth, but the area did not heal. Scabs would form and fall off about twice a week. He noticed no swelling in the neck. He absolutely refused any cutting operation, so that it was impossible to get a section for the pathologist. Dr. George T. Jackson, of this city, said, however, that there was no doubt of the diagnosis.

*Physical Examination.*—March 7, 1902: To the left of the middle of the lower lip there is an ulcer about  $\frac{1}{2}$  inch by  $\frac{1}{4}$  inch. It is very slightly indurated around the edges; there are slight scabs on its surface; and it bleeds easily. There is no enlargement of the cervical glands.

*Treatment* was begun March 7, 1902. To excite the tubes the coil usually was used, occasionally the static machine. The tubes used were of very low vacuum placed at a distance of 30 cm. for the first few treatments, but soon this distance was diminished to 15 cm. The time of exposure was 5 to 10 minutes. In all, nineteen treatments were given, about 3 a week, but the patient was of necessity irregular in presenting himself owing to his occupation. On May 24, 1902, the last treatment was given, the ulcer being healed. August 31 a letter from the patient said there had been no return. October 7 the patient was seen and there had been no return. It is perfectly healed, only a very slight thickening being left. There is no glandular involvement. The patient still smokes constantly, but on the other side of the mouth.

The patient reacted most satisfactorily to treatment. Seven months have elapsed since the last treatment and there is no evidence of return. No burning was produced. The growth was superficial and there was no glandular involvement, but it had proved resistant to other methods of treatment.

CASE II.—Epithelioma of the lip. Charles McH., Irish, aged 80.

*Family History.*—His father had a cancer of the lip removed by operation without recurrence and died years later of senility.

*Personal History.*—For 65 years the patient has smoked a short-stemmed pipe. Since the middle of March, 1902, he has noticed a slight induration at the middle of the lower lip which has never healed. It scabs over. The scabs fall off and it bleeds, being a source of great annoyance.

*Physical Examination.*—August 28, 1902: There is a small indurated area at the middle of the lower lip about one-half inch in diameter covered with a scab, which, being removed, causes bleeding. There is no enlargement of the cervical glands. The clinical appearance is typical of epithelioma.

Dr. A. J. McCosh advised against operation on account of the patient's age and infirmity. Treatment was begun August 28, 1902. The coil was used to excite tubes of very low vacuum placed 8 to 15 cm. from the area treated. The treatments were given irregularly at first, but between August 28 and September 30, 17 exposures of 10 minutes each were made. As no effect seemed to be produced the treatments were then given more frequently, 13 exposures being made between October 1 and October 18, at the end of which time the area had markedly increased in size, being *twice as large* as when first seen. The patient was advised to discontinue treatment temporarily on October 27. On November 17, when next seen, there was a marked improvement, the area having diminished in size to its original dimensions. Four treatments were given on alternate days and the patient disappeared, being confined to the house with a severe bronchitis (?). On December 17 he again presented himself, showing to my astonishment a lip absolutely healed, with healthy mucous membrane in place of the ulcerating area and a disappearance of all induration. Up to this time the number of treatments had been 36. He is still having weekly exposures.

The improvement and final healing after rest and cessation of the treatment was *remarkable*. There is in certain cases a cumulative effect of the rays, their influence continuing after the treatment is stopped.

THE RELATIVE FREQUENCY OF THE X-RAY  
BURN.*(Continued from the May issue.)*

One of a few X-Ray workers in whose practice no X-Ray burn ever occurred is an English physician, Dr. Sharp. It is hard to find the cause of this from a distance, and her article is not clear on this point. She thinks it is her technique, but even under a much more careful application of the Ray than Dr. Sharp employs, grave accidents have followed.

My statistics shows that X-Ray burns occur, but we do not know the why and wherefore.

Physicians of great experience, when asked the question how high they estimated the probability of an X-Ray burn, were very cautious in quoting figures, and their answers certainly did not intimate that here we have to do with "a very dangerous agent."

Gocht stated in 1898 that in the Hamburg-Eppendorf hospital, out of a total of over 2,000 exposures, there was only one burn.

Albers-Schoenberg, in the same year, was also of the opinion that the probability of a burn is only very small. He, perhaps the most competent X-Ray expert, says that despite of his frequent radiations for diagnostic purposes up to that time, he *never* had seen a burn. And that was at a time when exposures of twenty minutes were customary, and the tube was placed very near to the body.

It is obvious that in radiotherapeutics, where the exposures are often made and have to be made day after day, if we want to be successful, the possibility of the burn will increase. And we must not forget—in drawing our conclusions—that for diagnostic purposes the Rays are nowadays much more harmless than in former years.

Hoffa says the occurrence of the burn is in the proportions of 70 to 10,000, which small figure (0.7 per cent) is not obtained in the statistics of even the most harmless operation.

Yes, it may be said without exaggeration that through certain internal and doubtless through many of the "specialistic" measures far more persons will be injured than through the application of the Roentgen Rays.

In the course of six years, having made over 3,000 fluoroscopic examinations and photographs under the use of different kinds of apparatus. I have not seen one single injury; taking the hours of exposure in radiotherapeutic employment into account, the ratio of injury is not more than about 1:1,000 (0.1 per cent).

It has been said that the individual "disposition" was an important factor in the relative frequency of the X-Ray burns. It cannot be denied that there is a disposition, but what this "something" called disposition consists of nobody seems to know, and the candid critic must admit that it is nothing but a word to cover our ignorance.

Let us first consider the disposition, as it is said to exist, according to the types of the pigment of the body, i. e., let us see of what consequence the color of the skin and the complexion is. There are observers who claim that these factors are of much importance. Only he can support this opinion who, prejudiced by his pretended success, does not know the literature.

To prove this I give a brief review of the material of one radiotherapist. According to Sjorgen and Sederholm, the injuries were as follows:

A—Blondes.

Case 13, with 21 exposures; reaction mild.

Case 4, with 19 exposures; reaction mild.

Case 6, with 12 exposures; reaction very mild.

B—Brunettes.

Case 1, with 22 exposures; reaction strong.

Case 2, with 20 exposures; reaction very strong.

Case 5, with 18 exposures; reaction present.

Case 7, with 16 exposures; reaction strong.

Case 7, with 15 exposures; second period, reaction strong.

Case 8, with 15 exposures; reaction medium.

Case 9, with 18 exposures; reaction intense.

Case 10, with 29 exposures; pronounced swelling.

Case 11, with 35 exposures; very strong reaction.

Which goes to show that both the blonde and the brunette patients "react"; if a certain degree of Roentgen irritation is exceeded, which it is impossible to estimate in each single case, they will "burn."



Besides this *congenital disposition*, which cannot be denied, there is a *temporary disposition*, the existence of which I always assumed, although I have never seen it mentioned in the whole literature.

According to Beck (New York), the weather plays an important role in the origin of the X-Ray burn. If an observer like Beck, who *disposes* of a very great material, expresses such an opinion it is our duty to examine it.

Of course, at a time when a "cold" is nothing but a name for a nursery tale, when the causes and factors of a disease are supplanted by a bacterium, the true devotee of science on leaving the doors of his alma mater will smile on how far behind the older physicians are. The introduction of a factor like the weather into the causative factors of the X-Ray burn will, therefore, not be approved (not find universal consent). But every X-Ray worker whose hands show the well-known desquamative dermatitis knows that he must be more careful in winter, while in summer even a weeping eczema spontaneously disappears.

Considering, however, that a face that has just been exposed to the X-Rays is more liable to be influenced by the difference of temperature and moisture in the room and without, we must admit that such an irritation has not always only a transitory effect.

And how many incidental irritations of this kind may a radiated surface be exposed to?

We have, therefore, to take this factor into account and perhaps the future statistics will also consider this point.

On the other hand, we have a case where, despite of a dressing, a Roentgen ulcer occurred (Deutschlander) after one week.

Thus we see that a similar origin for the X-Ray burn—as far as they depend on the condition of the tissues of the patient—cannot be found. Just as everywhere in nature, it will not be the ridiculous "ens" which could be called the cause of a pathological process, but we have rather to assume a chain of circumstances which eventually lessen the relative immunity of the tissue and in combination with an accidental cause render the latent disease manifest.

Whether this irritation is another radiation of the same quality or a radiation intensified by a longer seance, a shorter tube distance, a longer spark, etc., or climatic factors interfere, will be all one for our standpoint.

At any rate, the riddle can hardly be solved by laying stress upon minor details and heaping reproaches upon the radio-therapeutist, nor by coining nice words and phrases.

"Nescimus," the conscientious physician will say, who knows everything that pertains to the subject, but at the same time it will be his endeavor, both by improving the technique and heeding suitable amendments, to ameliorate the matter.

A certain percentage of lesions and burns will always happen unless our human actions, thanks to the progress in literature and civilization, will become ideal.

*But the Roentgen accidents of to-day have to be judged from the viewpoint that they are extraordinary occurrences, the prevention of which is beyond the power of the conscientious X-Ray therapeutist.*

The introduction of the word "misfortune" in the place of "carelessness" will certainly be but beneficial to our special branch of science.

(Translated from *Arztliche Rundschau*.)

A. DECKER, M. D., Chicago.



### A CASE OF LUPUS.

Reported by **May Cushman Rice, M. D., Chicago, Ill.**

The atypical character of the following case has made it one of unusual interest. The rapid development of the disease and extensive involvement of the tissues having misled some of our eminent diagnosticians.

Mr. F. was referred to my clinic at the Illinois School of Electro-Therapeutics for X-ray treatment by Dr. Nellie Flint.

When he presented himself for treatment Nov. 15 he was in a most pitiable condition. His forehead, nose, both cheeks and lower lips were the seat of large ulcers, which frequently discharged pus and were covered with heavy crusts. His nose was enlarged and entirely bridged over with crusts. His nasopharynx was ulcerated and causing a constant desire to clear his throat, which he was unable to do. The patient in describing it said that his throat felt perfectly rigid and as hard as a rock. His lower lip was especially disagreeable to him, as the ulcer extended well up in his mouth, exuding so much pus that he succeeded in taking food with great difficulty. There were also large ulcers of the same character upon both arms. His appearance was so repulsive that he had the greatest difficulty in obtaining a lodging place and was obliged to take his meals in his room. There was marked depression of spirits, loss of appetite and insomnia. The following notes were contributed by Dr. Cora Howerth, who attended him the first few weeks of his illness at Hahnemann Hospital and who first made the diagnosis of lupus.

"Last March he was taken ill with grippe, followed by intermittent fever. At about ten o'clock each morning his temperature began to rise. He complained of chilly sensations—his hands and feet were cold, his finger nails blue. After the chilly sensations had passed away the temperature arose sometimes as high as 103 degrees, followed by such profuse sweats that his linen and bed had to be changed every morning. He had attacks of very severe pain in his forearms and legs, a temperature above normal all the time, but higher in the afternoons, and was sleepless and very restless. His appetite was good, but his bowels were constipated. An eruption resembling urticaria, accompanied by severe burning and itching, appeared upon his hands and thighs. This disappeared in two days, leaving nothing in its wake. In a few days another eruption closely resembling smallpox appeared, this one being composed of sensitive furuncles which contained a thick greenish discharge and formed hard black scabs. These disappeared in a few days, to be replaced by others. This eruption invaded the face, scalp, arms, the middle of the back and chest. Be-

fore long his throat ulcerated and his suffering in attempting to swallow liquids was excruciating. The discharge from the posterior nares and throat was the same in character as that from the ulcers on the surface. The ulcers would heal for a time, but would break out again. In breaking down they always began in the center and in healing did the same. A slight swelling of the inguinal glands subsided under hot fomentations." At the end of six weeks he left the hospital and went to his home in Enfield, Ill., where, although he gave no history of syphilis, he was treated for that disease until August. He then returned to this city and consulted Dr. David Lieberthal, who prescribed large doses of mercury, both internally and by inunction. Under this treatment he grew steadily worse, both as to the condition of the ulcers and his general health. He was also seen by several other physicians, among them Dr. F. H. Montgomery, a skin specialist, who was very positive in his diagnosis of syphilis. Dr. C. B. Collins had previously expressed the opinion that it was a case of ecthyma. After the ulceration in the throat appeared he changed his diagnosis to syphilis. Dr. C. S. Neiswanger saw the patient when he came for X-Ray treatment, made the diagnosis of syphilis and advised the use of iodides and mercury rather than the X-Ray.

A microscopical examination was then made, however, by Dr. Nellie Flint, who found the tubercular germ, whereupon X-Ray treatment was begun.

The static machine was used to excite the tube, which was of low vacuum, and placed six inches from the face of the patient. A lead foil mask covered the eyes. Daily ten-minute exposures were made to each side of the face. After the 14th exposure a slight dermatitis developed, when the treatment was interrupted to allow this to subside. During this time the discharge increased. The patient also suffered severe neuralgic pains in the forehead, which he attributed to taking cold, as he had been out daily in very severe weather. He suffered to an extreme degree from depression of spirits—would come to my office and cry aloud for five or ten minutes, and on several occasions threatened suicide. After ten days' rest he again resumed treatment, which was now given only three times a week. From this time on there has been

a steady improvement, until at present, two and a half months since the beginning of treatment, the crusts have entirely disappeared from his face, leaving a reddened but healthy skin. The nose, which was apparently a solid crust, has regained its normal size and appearance. The ulcers in the naso-pharynx have wholly disappeared. The lower lip, which the patient believed would be completely destroyed, shows scarcely any sign of the disease. The forehead, though healed, presents some scars which are due to destruction of tissue during the process of the disease. He is now under treatment for his arms. Owing to the fact that his general health has suffered considerably at times during the treatment from absorption of toxic substances, I believe it was wise to allow his face to heal before treating his arms. Otherwise exposures would have been too long. His general health is improving rapidly. His appetite is good and he sleeps well. While for a year past he has scarcely been tolerated sufficiently to gain food and shelter necessary for existence, his appearance to-day is such as not to debar him from taking a position. To say that he is happy and grateful only feebly expresses his state of mind.

Such cases as this show the great possibilities of the X-Ray, and emphasize the importance of a microscopical examination in making a correct diagnosis.

*(New Albany Medical Herald.)*



## HYPERTRICHOSIS TREATED WITH THE X-RAYS.

By Ida M. Wilson, M. D., Columbus, O.

I always welcome the American Electro-Therapeutic and X-Ray Era, and I was very much interested in Radiotherapeutic Observations by Dr. Zeisler found in the June number; particularly was I interested in the treatment of hypertrichosis, as I have been called upon to do a great deal of that work. I have used both the galvanic needle and the X-Rays. The X-Ray method is certainly the ideal way, as it is painless, leaves no scars and is not tedious, either to the patient or the physician. The same cannot be said of the galvanic needle. I have only used the X-Rays in two cases, with the following results:

Case No. 1, a treatment of five minutes' duration was given daily for three days, then I waited for three days to see how the skin would stand it; as there were no signs of a reaction, four more daily treatments were given. At the end of six days, after treatments were suspended, there was a slight redness over the cheek and the hairs were gone, where or when the patient did not know. I then lost sight of the lady for a month; then she returned and as there were a few hairs growing I gave her a treatment with the understanding that she would come back the next day, but she failed to come, and just two months after I had given the first course of treatments she returned with the hairs about as numerous and as long as on her first visit.

Three daily treatments were again given, and then, as the lady is a nurse, she again was called away, and she has just written that there was a slight burn, but the hairs were still growing.

Case No. 2 was a lady from out of town, and I only had two weeks in which to do the work. Six treatments were given and the hairs all came out in ten days' time. After the hairs came out there was a slight burn, which soon disappeared. At the end of two months she wrote me that the hairs had again appeared in about the same quantity that was there before treated.

So that so far I do not feel that I can recommend the X-Rays to my patients as a sure thing in the removal of superfluous hairs.

I feel that I can say positively that it will remove them. But I can't promise that they will not come back nor can I feel sure that other treatments will in time destroy the roots so that they will not return. But I have watched cases treated with the galvanic needle and have seen the hair grow, if not in the same place, in the same locality, until the patient doubts the success of the treatment. Case No. 1 of this report had been treated by the needle with apparently no success. The X-Ray treatment in these cases is certainly an interesting experiment, and I intend to use this method in every case that is willing to let me experiment.

I should like to know what success others are having in this work.

It would also be interesting to learn whether the X-Rays will have any effect on the so-called liver spots, on moles and other blemishes on the face or hands.



#### BOOK REVIEW.

A valuable treatise on electro-therapeutics is "The Medical and Surgical Uses of Electricity," by Dr. A. D. Rockwell, A. M., M. D. This book has passed through eight or nine editions, the present work bringing the matter down to date. A treatise on any subject should be conservative and should give results which have borne test of thorough and skillful applications. The general practitioner relies on a treatise more than on separate articles in the medical journals, because here he recognizes original work, which, though successful in a limited number of cases, may not be efficient in general practice. The book certainly fulfills these requirements.

Methods of the application of the faradic and galvanic currents are carefully described and the indications and counter-indications are given. The static machine and its applications are satisfactorily treated. The book is not afraid to

clearly indicate conditions in which the electrical current is not so uniformly successful as was first claimed. Books which are unduly optimistic should certainly be avoided, and we can heartily say that this book does not belong to that class. It will be a valuable book in the working library of the electro-therapist.

Six chapters are added on Roentgen Ray work, the Finsen light, vibratory therapeutics and the high frequency current. These subjects are not treated with as great detail as is electricity and the static machine. The treatment in these departments is not in the nature of a treatise, and in our judgment enhances very little the value of the work.

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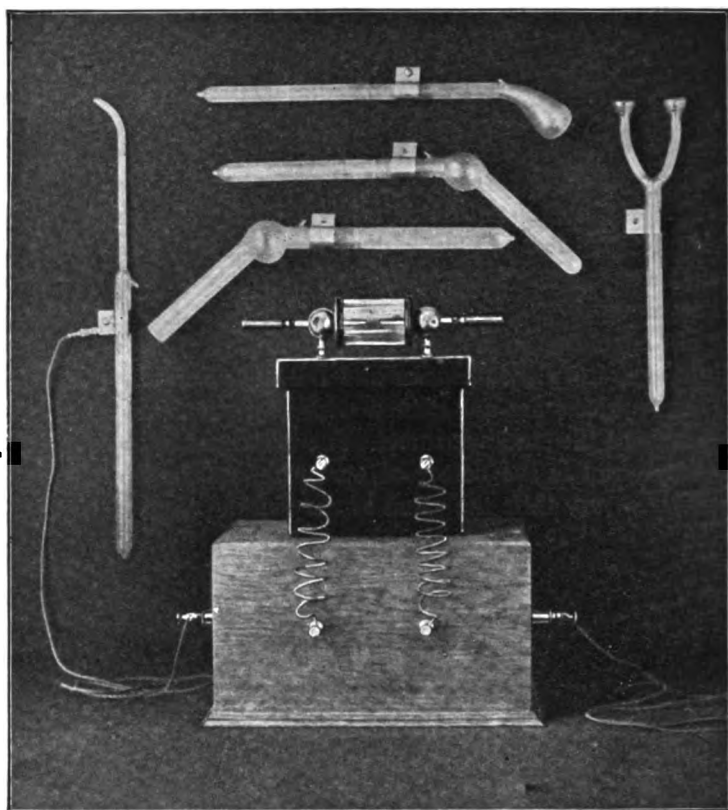
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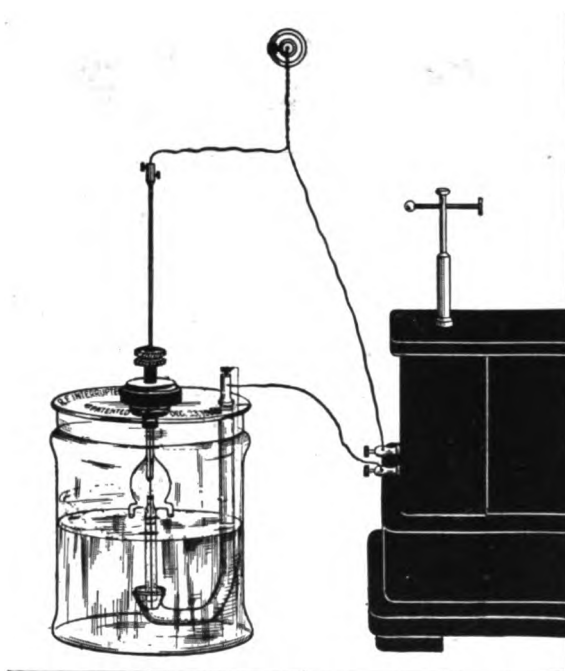
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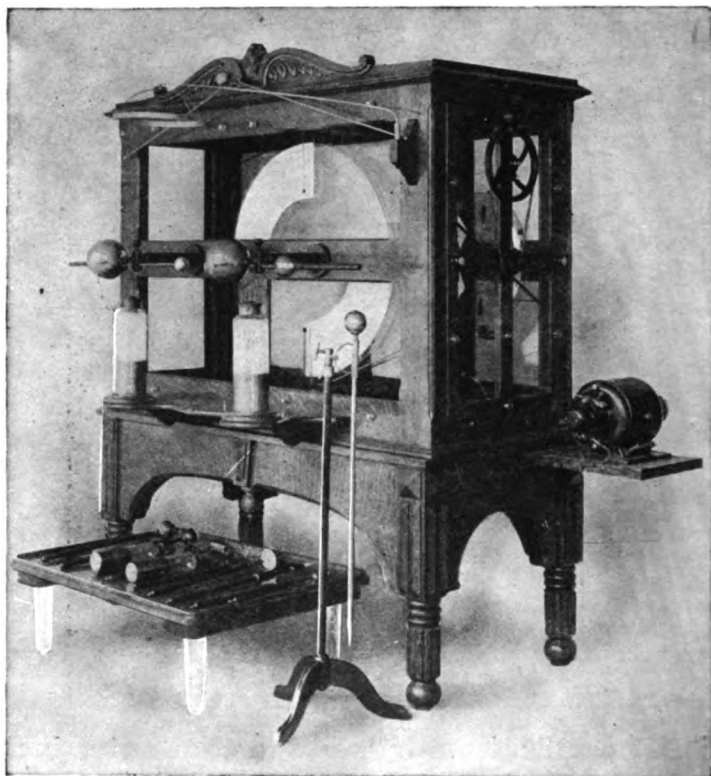
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# American Electro-Therapeutic and X-Ray Era

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August, 1903

No. 8

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## Original Contributions.

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### THE ACTINOSCOPIC METHOD FOR THE EXACT DETERMINATION OF THE HEART BOUNDARY.

By Prof. Dr. E. Grunmach, Director of the Royal University  
Institute for Examination with the Roentgen Ray in Berlin,  
and Dr. A. Wiedemann and Assistants.

That which tends to the science of diagnosis of heart diseases (the newly invented X-Ray apparatus herein described) will in the near future prove of incalculable value to the medical and surgical profession, since palpation or percussion in their local applications are inadequate and so to speak unreliable. The mechanical machine aims to produce a shadow-graph or silhouette which in all its details gives an exact contour of the heart's dimensions, showing the same through the fluoroscope by an automatically drawn picture of the heart. In this device, which is as ingenious as it is practical, the fluoroscope is provided with an attached pencil, so that when this latter is moved a like movement of the tube will delineate the object to be radiographed; thus, the circumscription canstrated by the diagrams herein presented.

### DESCRIPTION OF APPARATUS AND PRELIMINARY ADJUSTMENTS.

Fig. I shows the apparatus upon a wooden frame; the rear end holds the vacuum tube, while the front side maintains the fluoroscope. The patient is most suitably placed in an



erect position, in preference to a horizontal placement, and in contrast to the device of the Orthodiagrapher invented by Prof. Moritz of Munich, which is in table form. The apparatus shown herein is of a more universal application, as patients may be examined in all positions whether placed in a perpendicular, horizontal, or sitting position.

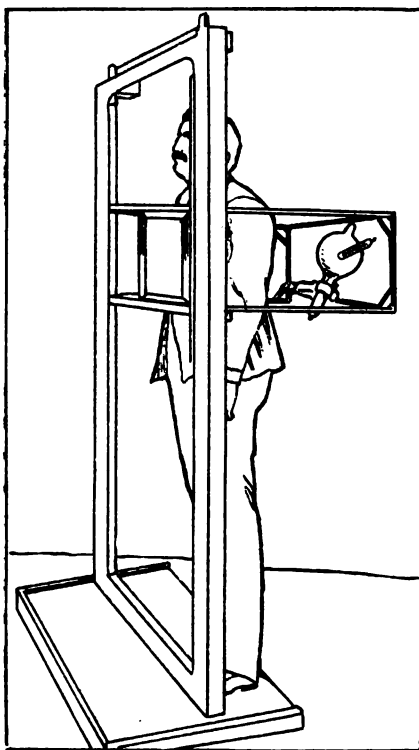


FIG. 1.

Fig. 2 presents the apparatus upon a column (S), having a ratchet which can be raised or lowered by a crank (K). To this is affixed the two unequally long prongs, for the purpose of placing the body according to its size. By one movement the device may be raised or lowered. Upon the forward longer end of prong (G), which carries also a water level, is

suspended a frame (Z) with a centimeter scale (sk). This frame is fastened solid in a perpendicular unmovable position to the prong (G) and serves the following purposes: First, for placing the patient in the right position, by placing the three sliding pegs ( $P_1$ ,  $P_2$ ,  $P_3$ ), with their ends upon the border of the three upper ribs and upon the center line of the sternum whereby these points will be outlined upon the fluoroscopic screen and the distance between them can be measured upon the body as well as upon the drawing board; secondly, this

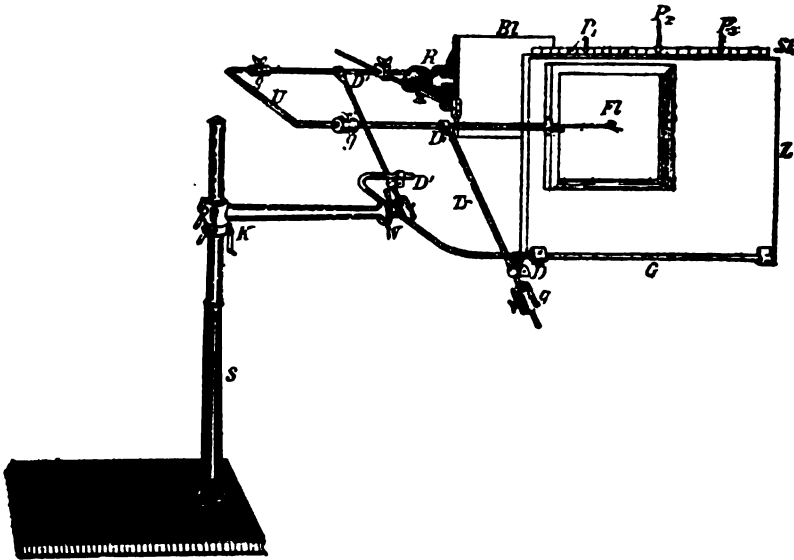


FIG. 2.

frame (G) is used for carrying a drawing-board appended upon the fork (G), assisted by two movable supports (tr), which are counterbalanced by weights (g), is connected a U formed tube (U), whose rear end shank connects with the X-Ray tube (R) and the lead shield (Bl) and the front end of which holds the fluoroscope (Fl). The tube, the fluoroscope and the pencil are thus movable and are all connected to the same tube (U). In the center of the fluoroscope an opening is provided for holding a tracing pencil, whose point touches

the drawing-board or chest. As it appears, the vacuum tube, which should be provided with regulating facilities, may be affixed to the lead shield by a clamp, while the anti-cathode should be exactly in line with the central orifice of the fluoroscope. For purposes of exactness, the orifice is supplied with cross wires. The positive anode-focus will be obtained, however, by inserting a cylindrical iron rod about 30 centimeters in length through the pencil shell to guide this. During the issuing of the X-Ray, the shadow image of the rod will be plainly discernable upon the fluoroscope, and this must conform to the cross-wires of the orifice in the fluoroscope. The required centralized focus is then obtained. This procedure is absolutely necessary in order to make a correct examination of the heart.

Fig. 3 shows with what great exactness the outline of an irregular object may be drawn. The dotted line is the outline obtained on the drawing-board and the heavy line is the object.

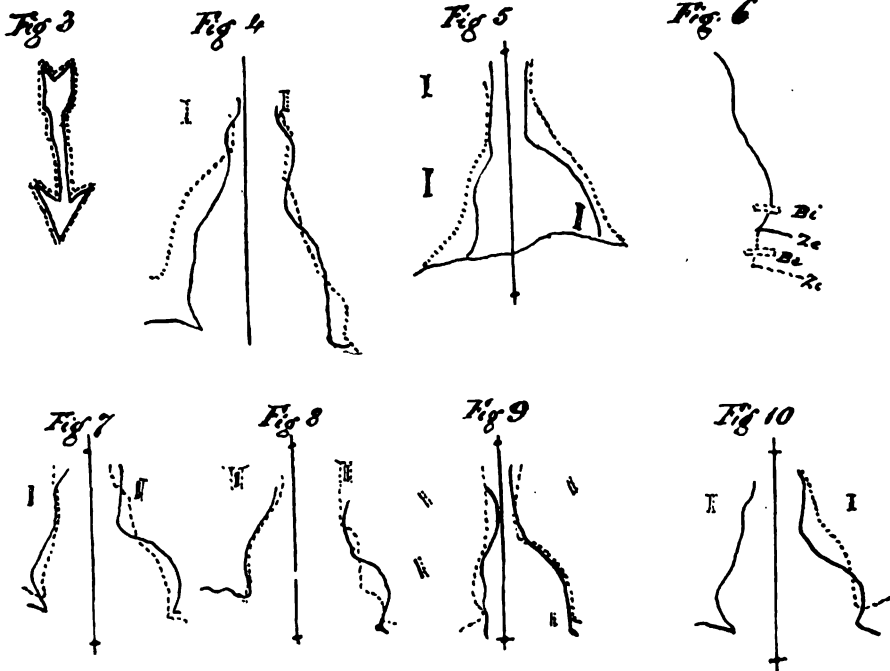
With a little experience the object may be outlined with full strokes of the pencil, only it is better to outline externally any organ by making a succession of points on the skin. For purposes of great exactness the pencil may be provided with a set of sights like those of a gun, and the point of the pencil can then be brought exactly upon the shadow cast by the heart.

Prof. Moritz of Berlin reports in the *Munich Medic. Wochenschrift*, No. 29, 1900, that a heart filled with blood may be readily obtained in a shadowgraph by following the above method.

#### PRELIMINARY EXPERIMENTS.

An exact apparatus must be so constructed that the outlines of a patient's heart can be traced several times and these outlines must agree. Fig. 4 illustrates such a case. The straight line is the median line of the body; the unbroken outline of the right and left boundaries of the heart was obtained when the rays were made to pass perpendicularly to the plane of the chest-wall. A small piece of lead was placed upon the middle of the sternum and another one correspondingly on the back.

The shadows cast by these overlapped. The patient was then turned so that the shadow of the front lead-marker appeared turned about three centimeters to the left and the marker on the back a corresponding distance to the right. (These two are shown in the vertical short lines in the figure.) This rotation was altogether negligible, corresponding to an angle of about 6 degrees, but the outline obtained did not at all closely correspond to the first outline (the dotted line is the outline



of the second experiment). The greatest length-diameter of the heart is here increased about 2.1 cm, and the breadth diameter 1.3 cm. It was therefore evident that improvements needed to be made if changes in the size of the heart due to alcohol, baths, etc., are to be determined. We, therefore, tried to accurately centralize the patient, and for that purpose used at the beginning four lead marks upon the front chest-wall and an equal number upon the posterior wall, so that the shadows would overlap. Later on we reduced the number to

two upon each wall. Now, although this was an exact method, the adjustment required too much time, and we finally used the iron pegs as mentioned above. These pegs must be placed upon the upper ribs which move but very little during the process of breathing and the patient must be cautioned to see that the pegs do not move during the examination. Even with this care, however, two successive pictures did not exactly agree, as shown by Fig. 5. It is possible to obtain absolute agreement if the two drawings be made at the same phase of the breath for example, at inspiration. A disadvantage is that the silhouette of the heart can best be taken during quiet breathing; moreover the patient is required to hold his breath for too long a time. The cause of the difference of the shadows upon the drawing board and the skin of the chest wall lies in the opposite motion of the chest walls and the diaphragm during breathing. At inspiration the chest cavity rises a little, especially at the plane of the fourth or fifth rib, while the diaphragm descends and with it very slightly the heart.

If now a point of the heart's contour be marked upon the wall of the chest during inspiration and another during expiration, while the patient is quietly breathing, the distance between these points does not correspond with the real distance, but is either too large or too small since the chest-wall and the heart move in the opposite direction. Fig. 6 shows this condition. The left boundary of the heart is depicted. A small lead mark (Bi) was fastened upon the fifth rib and its position at inspiration is shown in the diagram, while Zi is the position of the diaphragm. The dotted line and the corresponding marks show the positions of the lead-marker and the diaphragm at expiration. It is seen that the lead mark at inspiration is a little high and the diaphragm a little low, while at expiration Be is considerably lower than the diaphragm (Ze). At the same time we notice a movement has taken place sidewise of the lead mark, in this case exceptionally small, and consequently it is better to draw on the board than on the skin. There is then only the small error that the heart and the diaphragm move during the process of breathing.

As a further experiment to test the exactness of the method we made drawings of the heart from both posterior and anterior views. Since each time the same perpendicular rays were used, we would expect that in form and size the shadows would coincide. This was, however, not exactly the case, because the greatest diameter in the anterior view was enlarged a few mm. On the right side of the heart the two tracings usually coincided, but we could not get the left side of the heart quite correct. This was probably because the heart turns on its axis at every contraction, and the drawings might have been taken in two different phases of the heart's action. Figs. 7-8-9 illustrate these points. Figs. 7-8 show the coincidence in the tracing of the right side, while Fig. 9, in which both tracings were made in the same breathing phase, show a coincidence on the left side, but not on the right side. The slight difference noted may be also due to the nearness of the heart to the anterior chest-wall, which would make the shadows slightly differ when the patient was placed in the two positions. In one case it is at a greater distance from the fluoroscopic screen. It also appears when the subject holds his breath for a considerable length of time, the left upper boundary of the heart changes. This seems to be due to the distension of the blood vessels. This was proved by taking a radiograph of the patient's heart at deep inspiration and again at complete expiration. The different sizes could be exactly determined and measured. In this experiment the subject was a laborer 45 years of age. The greatest diameter of the heart was enlarged about 2 cm. The full line in Fig. 10 shows the heart's boundary taken during quiet breathing. The broken line shows the boundary at the full inspiration and the light dotted line at expiration. The expansion of the shadow to the left shows that the velocity of the blood stream was checked in the pulmonary artery. This agrees with the radiographs taken in 1897 by Dr. E. Grunmach (Berlin. klin. Wochensh. 1897). During this experiment the drawing must be done very quickly because the shadow of the pulmonary artery contracts and the forced expiration cannot be held too long on account of its danger. We tried the person in different positions to decide the important question whether

the drawing should be made in the standing or horizontal position. Figs. 11, a, b, c and d, show the corresponding shadows when the patient was respectively in the standing and the horizontal position. The dotted line corresponds to the horizontal position, the full line to the erect. In Figs. 11, a and d, the horizontal diameter of the heart is shorter (see dotted lines). Prof. Moritz found the reverse condition (Mun. Med. Woch. 1902).

We had already in a former publication called attention to the fact that when the heart and lungs are diseased the patient should not be placed in the horizontal position. Further experiments led us to choose the sitting or standing position.

We centralized the reclining patient by means of the lead marks on the breast and back and made a drawing of the heart's outline, at medium breathing, at forced inspiration and at forced expiration. After that we turned the apparatus upright and properly centralized the patient in the standing position.

We could prove likewise in b and c the increase in diameter. Our experiments have proved that this condition is obtained with healthy patients. In a number of cases of enlarged heart, especially in hypertrophy of the left side, the measurements in the horizontal position are smaller than in the standing position. These differences in size are most marked if the drawing is made at full inspiration.

How it happens that in special cases the horizontal position shows larger and in other cases smaller measurements than in the standing position may be seen by looking at Figures 12 and 13. Fig. 12 shows schematically a cross section of the chest cavity as seen from above. In the upright position the largest diameter of the heart is shown as the line  $L_1$  in the oval outline and its projection as the straight line  $L_1$  (representing the width of the heart as shown on the drawing board). When the patient is in the horizontal position the left side of the heart on account of the width of the organ falls posteriorly (more exactly the heart turns itself around an axis which extends through the crus of the diaphragm and the vessels of the lungs). The result is that the longest diameter is now  $L_2$  in the oval figure and its projection on the drawing

board is the straight line  $L_2$  seen above (longer than  $L_1$ ). The condition is, however, altogether different in enlarged

Fig 11 a

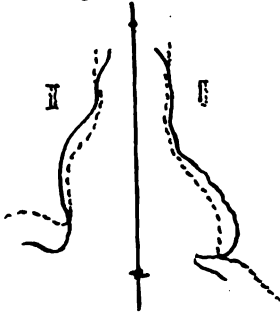


Fig 11 b

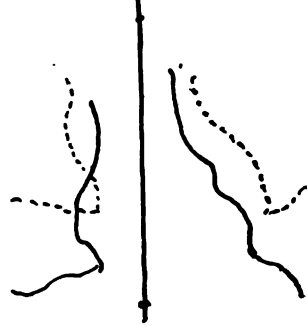


Fig 11 c

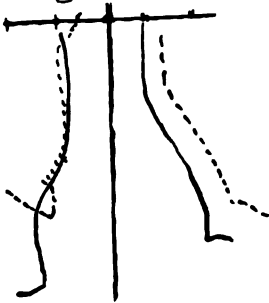


Fig 11 d

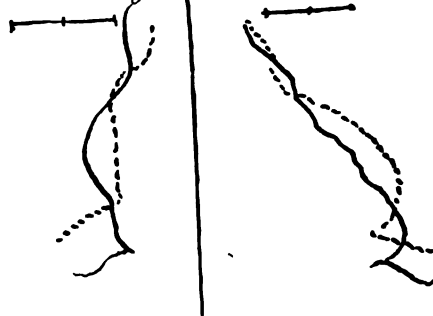


Fig 12  $L_2$

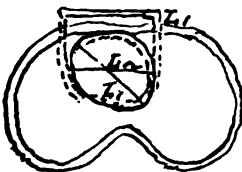


Fig 13

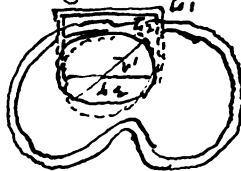


Fig 14



hearts, especially in enlargement of the left auricle and ventricle. In Fig. 13, when the body is upright, the largest



diameter is now seen to be parallel to the axis of the chest,  $L_2$  (since the anterior breast-wall will not permit the enlargement in the anterior direction). When the patient is in the horizontal position the heart turns more posteriorly to the left, as explained above, and the largest diameter is seen to be  $L_1$ , which is now no longer parallel to the drawing board, but is diagonal to it and its projection is therefore shortened. It must be, however, admitted that possibly the expansion of the chest and abdomen may have some influence on this rotation.

From these experiments in the determination of the heart's boundaries at different positions of the body it is shown that enlargements of the heart in different stages might well be overlooked; for example, in acute dilatation in consequence of strain or alcoholism. Possibly this accounts for the unusual results of Prof. Moritz, who found no increase in the heart's boundaries in overstrained or alcoholic hearts because his apparatus could be used only in the horizontal position. Measurements on the same patients placed in the upright position would have doubtless shown other results. In order to exclude such errors the heart measure taken only in the upright position will be used as standard measurement.

In this connection we may say that the rays may be sent sidewise through the chest only it is more difficult to place the patient correctly. Fig. 14 shows one of these X-Ray pictures. In this drawing it is shown very plainly how important it is that there must be uniformity in the direction of the ray with reference to the body and drawing-board during each measurement. The smallest turning of the body not only shows the change of the form of the heart, but also its apparent location with reference to the sternum and the spine. It appears, moreover, unusual in this picture that there is a shading away posteriorly of the front and upper heart boundaries from the sternum. The cause of this unusual condition is that the surface of the heart is forced backwards by the strongly expanded lungs.

The above experiments prove that under both normal and pathological conditions the actinoscopic method furnishes positive and exact information and is superior to percussion, auscultation or the other diagnostic measures formerly employed.

Most clinicians will probably continue to employ the old methods in their classes because it gives them less difficulty, but at the present time no other method can compare with the actinoscopic method, in the definiteness and exactness of its data.

(Abstracted from the *Deutsche Medicinische Wochenschrift* by C. H. Treadwell, B. S.)



#### HYPERTRICHOSIS CAUSED BY X-RAY.

By Edgar S. Ferris, Henry, III.

Miss H., aged thirty-six, brunette, under X-Ray treatment for a very severe indurated acne of several years' standing. The disease involved the forehead, both cheeks, the nose and chin. On the nose a marked rosacea, on forehead and cheeks a large number of inflammatory papules and pustules, on the chin about one dozen coarse, brown hairs, and at the angle of the jaws a very slight growth of down. She also suffers with valvular heart disease. During the month of January, 1903, patient received fifteen sittings; medium soft tube, three inches distance from surface of tube, time ten minutes, tube actuated by static machine. After the subsidence of resultant erythema and during the month of February she received seventeen exposures followed by erythema. As there was no improvement in acne, this time I did not wait for erythema to entirely disappear. During March gave twelve sittings at one to two days' intervals, which caused a mild dermatitis and disappearance of the down and most of large hairs on chin, and only slight improvement in acne. April sixteenth, after rest of two weeks, began treating such spots as did not show dermatitis or marked erythema, ten exposures within thirty days, when there was general but mild dry dermatitis. After

a rest of one month the reaction almost entirely disappeared and great improvement in acne. Most of the indurated papules softened and disappeared, all pustules became dry, and skin regained its normal color, and softness, except a few spots on forehead, which still showed the reaction and slight trace of the rosacea on the nose. June 21st, five weeks after last exposure, a thick growth of downy hair appeared over all surface treated except the few spots still under reaction, the coarse hairs returned on the chin, and during last five days the growth of hair has increased until in places it is one-half inch long. They are very fine, soft white hairs.

Ella S., age 27, blonde, hypertrichosis; profuse growth of down and fine white hairs covering lips, chin and cheeks. Received in all some fifty sittings, causing erythema and total disappearance of hair twice, only to return again and worse than ever; no dermatitis caused in this case. Patient discouraged and quit.

Agnes D., age 26, blonde, now being treated for third return of hair growth covering lips, chin, neck and cheeks. The treatment for the second return of hair growth caused a mild dry dermatitis and disappearance of all hairs, but in four weeks it was back again and each time it returns thicker and grows longer. It did not require as many exposures for the removal of the first reappearance as for the original. For the second about same as the first. Intervals of rest and return of hair same. At present time there is marked erythema; no dermatitis as yet and the fourth crop on this very fertile soil is about harvested.

Allen H., age 50, blonde, received X-Ray exposures for psoriasis involving among other parts the scalp. The psoriasis was symptomatically cured and although no erythema occurred there was marked depilation. In four weeks hair returned.

Daisy S., brunette, age 21. Alopecia circumscripta. Had measles when eight years old, followed by complete loss of hair, the scalp became covered again and then the hair fell out in spots and remained so in spite of all medicinal treatment. After twenty X-Ray exposures of five minutes each, soft tube, six-inch distance, all bare spots were covered with downy

growth, followed in few weeks by hair one inch and even longer in places.

The inference from my experience with X-Ray work is that it requires a very severe reaction, a decided dermatitis to cause a permanent removal of hair and of such severity that a permanent disfigurement of the skin is bound to follow from the resultant atrophy. That it is advisable only in cases where the hypertrichosis causes a marked disfigurement and the patient very urgent and forewarned of the results. That, on the other hand, it is one of the best agents we have in the treatment of alopecia.



## ULTRA VIOLET RAY IN THE TREATMENT OF LUPUS OF THE EAR, NOSE AND EYE.

By E. B. Grosvenor, M. D., Richmond, Ind.

In Copenhagen, Denmark, lives a middle-aged man, who has such ill health that he can scarce work more than an hour at a time and but few of these hours a day. This man belongs to the noblest of professions, is a physician, and his name is Dr. Niels Finsen. He is connected with the commune hospital at Copenhagen, where he had made his experiments in photo-therapy. When he first discovered his great truth, he being a poor man, was tempted to keep it for its commercial advantages, but his nobility of character and love of his calling caused him to give it to the world.

Finsen's success is but that of a man that knows a truth. In his pamphlet on "Light as a Stimulus," he referred to General Pleasanton's blue light craze of the seventies, who had small hold upon a truth, but lacked the scientific training or backing to perfect his scrap of fact. Dr. Finsen has been placed in independent circumstances by the Danish government, and is

now devoting his life to his work of photo-therapy. Finsen took his doctor's degree in 1890, but, being too sick a man to endure the hardships of active practice, did what he could in the laboratories, where he developed his discovery.

Finsen first started to experiment with light to see what harm or what good it could do to the human body. He found that earth worms placed in an oblong box, covered half with red and half with blue grass, caused them to draw away from the blue to the red rays. In blue light they are uneasy, while in the red they are perfectly at ease. The chameleon placed similarly will turn black under the blue light, but remains white under the red light, which argues that the chameleon moves its pigment cells to protect the body from the blue rays. These experiments Finsen made led him to know that blue or chemical rays, including ultra violet, affect animal life physiologically. Red rays have no effect, nor have the others. The red and other rays will burn, when hot enough, but the violet will not. Red light, having no physiological action, is hence physiological darkness.

Now, it was observed that prisoners having smallpox that were kept in dark cells did not pit; hence, Finsen advanced from this analogy, without ever having seen a case of smallpox, that the red rays or physiological darkness would entirely prevent scars in smallpox. The next season saw an epidemic of smallpox in Bergen, Norway, where the red ray was tried by putting red glass in the windows of the sick apartments.

Dr. Svendsen sums up his observations as follows, "The period of suppuration, the most dangerous and painful stage of smallpox, did not appear at all. There was no elevation of temperature and no edema. The patients entered the stage of convalescence immediately after the stage of vaccination, which seemed a little prolonged. The hideous scars were avoided."

Hence it is deemed necessary to-day to get the best results in smallpox that the patient be confined in a room having nothing but red rays of light.

By the prestige thus gained and by being provided for financially, Finsen then in 1893 devoted his entire time to the development of photo-therapy. Knowing that the violet rays

would destroy life, he began using them on various diseased conditions, to kill the bacterial life, and from getting the rays through violet glass from the sun he began to get it from the electric light, and finally used a very large arc light, from which he could extend many telescope arms conducting the violet ray to many patients at a time. But the arc light was hot and water had to be used around the lamp to keep down the heat. The ultra violet ray was finally used as being more powerful, and the ray passed through natural crystal to concentrate it.

He also found that the ultra violet ray acted better upon bacterial life when the flesh was compressed, forcing the blood out, as the red corpuscles tended to neutralize the ultra violet rays.

Now, after his various and painstaking experiments he was ready to see what forms of bacterial diseases could be affected in a curative way. Lupus being the most prevalent of all skin diseases in Denmark, was first subjected to the ultra violet ray. His first patient was an engineer with a case of lupus of eight years' standing. He had been operated upon twenty-five times, been burned and cauterized to no avail. In 1895 he was subjected to photo-therapy, ultra violet ray.

At first, things being crude, a hand lens was used to condense the rays from an arc lamp. He removed the red and ultra red rays by passing the light through blue water. The results were that after the first treatment the disease ceased to spread, and by every day treatment continued for six months, Finsen cured his first patient; cured a case of lupus tuberculosis with a piece of glass concentrating light through blue water. From this on his success has been a repetition of this first case and the treatment is not painful.

Finsen's discovery met with prompt recognition. The Empress of Russia established a Finsen institute in St. Petersburg in 1898. Queen Alexandra soon established one in London. Now the blue water through which the rays were passed is discarded and clear water used to cool the rays from arc lamps, while ultra violet lenses are used to get the proper ray.

This is about all there is to Finsen's method, and the seances are had about an hour each day. Now, all the cases

treated, of course, are more or less severe, and will so continue until the supply runs out, when naturally they are milder because of shorter time diseased. Of course, other investigators have not been idle since obtaining the initial truth. In Paris they use a lamp that has one carbon of cast iron claiming greater ultra violet ray producing properties. There have been 398 patients treated at the London hospital, 149 of which have been cured and the others are improving.

The expense of the arc light of course prevented the physician in private practice from using the ultra violet ray until Dr. Minin, a student under Finsen, found that any light passed through ultra violet glass was efficacious. A mild light so used, while not as rapid in results, gives them just the same. Dr. Minin found that the direct or indirect current used by means of an ultra violet lamp, similar to the ordinary incandescent lamp when properly condensed had curative effects, little less than the larger arc lamp, although capable of accommodating but one patient at a time.

The Minin instrument is composed of an ultra violet glass incandescent lamp used with either the direct or indirect current having a powerful condenser and reflector behind it with the addition of a ground glass lamp to use after the patient has been exposed to the ultra violet ray. This lamp is called the massage lamp and the rays from it are caused to pass rapidly over the parts by being moved by the operator's hand. Minin claims that it acts the same as hand massage and practically it seems to be of advantage. Minin's modification of Finsen's apparatus or application to the needs of the general medical profession has placed it in the hands of any physician that may wish to use it, it being capable of treating but one patient at a time. This instrument has the advantage of having three ultra violet lamps, the treatment always beginning with the mildest lamp and gradually using the successive stronger lamps until the third or strongest lamp is being used.

This treatment has been recommended for nearly everything from lupus to neuralgia. I have given the treatment an honest test for many affections. It is claimed the ultra violet ray applied to a part for 10 or 15 minutes will cause sufficient anaesthesia to enable the surgeon to perform minor

operations. In my hands this has been an entire failure. For the relief of neuralgia, rheumatism and kindred affections it has been a failure. But it will cure lupus, acne and hematomas.

#### HISTORY OF CASES.

Case No. 1. Female. Age 73. Has been afflicted with lupus for 15 years, involving forehead, nose, ears and corners of the eyes; was suppurative at times, in the worst places. Had used various means to cure and been operated upon twice. She was a sad looking sight. I put her upon the ultra violet ray treatment, using it 25 minutes each day for one month, being careful at first to cover the eyes and afterwards giving them the exposure to treatment. Here I found great care had to be exercised, and treated the eyes but 10 minutes at a time every other day. The ultra violet ray, if used upon a wide-open eye, causes some difficulty of vision, hence great caution was necessary, but with care and short exposures no harm results. After the first month she was treated three times a week.

I have treated this case five months and the disease is entirely cured excepting one place, the worst, which will be healed in a very few weeks. I have given her no medicine of any kind, and nothing locally but paste to keep the scales soft, as they form as the treatment progresses and cause itching before they fall off, which itching can be relieved by keeping them moist with any paste you may choose to use.

Case No. 2. Female. Age 27. Lupus of the entire face involving the eyes; not as severe a case as the first and but one year standing, but spread pretty much over the entire face. She was treated the same way as the first and in three months cured.

Case No. 3. Female. Age 30. Acne Rosacea, five years, of nose having extended to the cheeks. As bad a case as I ever saw. Was treated every other day, eyes covered, for 30 minutes. After three months nothing is now remaining but a little redness of the end of the nose.

Case No. 4. Male. Age 28. Acne Rosacea, six months' standing. A few treatments and nothing of a diseased nature shows.



Case No. 5. Female. Age 71. Haematomata of the left leg from knee down to and involving the ankle. This stasis of blood was caused by many and long lasting varicose ulcers, which I had cured, but the blackened blood stasis which follows these bad cases so stiffened the limb that the patient could not walk other than about the house and that attended with pain.

After twelve treatments 20 minutes each, this patient walked to and from my office all winter, every other day, a distance of one mile both ways. She is well and nothing remains as a landmark of what has gone before but a mulatto tan color of the shin as large as the palm of your hand.

#### DISCUSSION.

By Thomas M. Stewart, M. D., Cincinnati, Ohio.

I find myself in the awkward position of discussing a therapeutic measure with which I have had no experience. My excuse for attempting the task lies in the conscientious effort I have made to follow this new therapeutic agent in the literature of the subject up to date.

The X-Ray and ultra violet ray, according to those best qualified to speak, are still in the experimental stage. Through the labors of conscientious investigators, and the author of the paper is in that class, the range and application of these therapeutic measures is rapidly nearing a definite basis. Men who "have given the treatment an honest test in *many* affections," as the author of the paper has done, are doing a splendid work for our benefit.

This whole field of "the newer electro-therapeutics" promises so much and does so little that it should put the beginner on his guard. The little that this treatment does, however, is so far superior to older methods that we must also guard ourselves from failing to give to it the full credit that it so richly deserves.

In the hands of an expert, one who thoroughly understands the physics of electricity in general and one who is an adept in its application in all its departments, can and does obtain results that the novice never will be able to duplicate unless he goes to the foundation and learns the fundamental facts and

{ principles by study, and, equally important, by laboratory investigations with complete electrical apparatus.

Without this knowledge, one is in danger of damaging his patients and ruining his practice. Patients are lead by their hopes and desires and not by their judgment. Too often, new therapeutic resources lead the physician into the same disappointing channel.

- The value of this paper lies in the following blunt and honest statement of the author: "It is claimed the ultra violet ray applied to a part for 10 or 15 minutes will cause sufficient anaesthesia to enable a surgeon to perform minor operations. In my hands (the author's) this has been an entire failure (and also a failure) for the relief of neuralgia, rheumatism and kindred affections. But it will cure Lupus, Acne Rosacea and Hematomata." His reported cases are in evidence, and he is in agreement thus far with many others.

~ The high-frequency current is giving good results in incipient paralysis, deafness, myalgia, lumbago and local rheumatoid affections.

There are numerous methods of making the applications, more careful study will doubtless show the adaptation of these methods to special derangements, and thus open the way to the selection of the particular method best suited to a given disease.

The beginner should make it a rule to follow the lead of those whose experience, as recorded in the paper I have the honor to discuss or as recorded in the special journals devoted to this branch of medical science, entitles them to speak positively.

~ There are too many men using the static machine or coils that are endeavoring to startle the medical world with some remarkable cure of an hitherto incurable disease.

~ They do not know that others better equipped and better qualified and who are treating from 20 to 70 cases daily, who are keeping most careful detail records, and who care nothing for local notoriety, are not yet ready to announce their results.

Be careful and yet be careful. Do not allow yourself to report a cure before your motor has stopped, any more than you would report a recovery from a surgical operation before you have tied the sutures. In either case, your judgment

would be greatly discounted, and after all the best equipped physician is he who displays the best judgment.

The red light adjuvant in smallpox has received high endorsement. I know of only two cases in which it was tried, but with complete failure in preventing the suppurative stage. Try it by all means, in all cases. It is the only way to prove its value.

The author's review of Finsen's work is most interesting, even to those who have followed the Danish physician in his labors for others in spite of his own physical ailments.

## THE RADIOTHERAPY OF SKIN DISEASES.

By Dr. H. E. Schmidt, Berlin.

For the cure of certain skin diseases the treatment by Finsen's method and by Roentgen rays is indispensable. The electric arc light in the strength and concentration as employed by Finsen kills bacteria, not only in the test tube, but also in the tissues. The histologic examination of pieces of skin exposed to the Finsen light shows degenerative changes of the cells of the epidermis and symptoms of inflammation. In lupus, twenty-four hours after radiation there is a distinct difference between superficial and deep infiltrations of the skin to be seen; in superficial layers, degenerative changes of the epitheloid cells, which may increase to necrosis in deeper layers; mostly good coloring of the nuclei both of the lymph cells and the epitheloid cells. After three radiations in lieu of the superficial lupus infiltrations, there may be seen young connective tissue without elastic fibers, while in the deeper tissues lupus nodules, unchanged and surrounded with elastic fibers, are still present. Improvement begins on the surface, the deeper lupus infiltrations are benefited after the cure of the superficial ones, which prevent the rays from penetrating deeper. It is important for the cosmetic result that even after frequent radiations of the same place the stratum papillare is not injured, and the light in an elective manner acts on the cells.

For the X-Rays a bactericidal effect could not be proved so far. Favus germs in hairs which came out after X-ray

radiation proved perfectly alive and active. The histologic examination shows similar to the Finsen light, degenerative changes of the cellular elements of the skin, respectively of the infiltrations and the inflammatory processes within. But with a stronger Roentgen radiation the degenerative changes are not confined to the cellular elements, but it may come to a necrosis of the connective tissue leading to the Roentgen ulcers which show little or no tendency to heal.

According to the strength of the radiation there may be microscopically distinguished three degrees of Roentgen dermatitis: 1. Simple hyperaemia; 2, swelling and blistering; 3, necrosis.

The Finsen light is the best method of treatment in all those cases of *Lupus vulgaris* in which either from the extension of the diseased area or from cosmetic reasons a total removal with the knife is not possible. The method is harmless, painless and shows cosmetic results that could not be accomplished otherwise. It makes no scars. The radiated area is, after the healing of the photochemical inflammation, surrounded with a pigmented zone, which in the course of time disappears. The skin itself, provided of course that it had no cicatricial changes before the light cure, can hardly be distinguished from the neighboring unexposed skin, with the exception, perhaps, of a peculiar little noticeable atrophy.

The chances to remove even the deepest nodules are more favorable than with any other method and the removal of recurrences, which are never total, but always partial, is easier.

For the treatment with X-Rays the author especially recommends favus, sycosis and hypertrichosis. The essential factor in these three diseases is the elective action of the Roentgen light on the hair papillae, which causes an effluvium capillorum without necessarily visible symptoms of inflammation. In cases of favus and sycosis, a mild dermatitis seems to be of importance for the process. But stronger inflammations must be avoided to prevent permanent baldness.

In cases of Freund (Vienna) recommends, after the effluvium capillitu, to employ the following for the bald spots:

Acidi carbolici glycerine soluti.....	2.5
Lanolini .....	50.0

After six to eight weeks the new hair begins to grow again, and in many cases the disease is cured. In some cases a relapse makes a short after-treatment necessary. Sycosis also shows encouraging results.

In the treatment of hypertrichosis it is essential to avoid all visible reaction; then, after the hair have come out, the skin looks smooth and unchanged. It remains in this condition for six or eight weeks, then the hair begins to grow again, and a second treatment is necessary, but if this second treatment is begun after four to six weeks and the radiations once or twice repeated after the same time, the skin will permanently remain hairless.

It is questionable whether, aside from favus, sycosis and hypertrichosis, the Roentgen treatment can accomplish more than other methods. Cures and improvements have been reported in cases of lupus vulgaris, canceroid, carcinoma and chronic eczema. The treatment of psoriasis and lupus erythematoses with Roentgen rays should be given a trial only in inveterate cases, which could not be benefited by the usual methods.

At the end of his article the author gives the results of 108 cases of lupus which have been treated with Finsen's arc light in the institute of the University Policlinic for Skin and Sexual Diseases in Berlin (Prof. Dr. E. Leßer):

Cured .....	29
(a) Free from recurrence for over one and one-half years	3
(c) Discharged only a short time.....	19
(d) Recurrence .....	6
Almost cured (insignificant remnants of the disease remaining) .....	20
Improved .....	57
Results not satisfactory .....	2

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Total ..... 108

(Abstract from *Zeitschrift Für Diätetische und Physikalische Therapie*, July, 1903, by A. Decker, M. D., Chicago, Ill.)



## A CONTRIBUTION TO THE STUDY OF CANCER MORTALITY.

"Charles Templeman concludes, as regards cancer in the city of Dundee: (1) That the death rate from cancer as a whole during the twenty-five years under review has more than doubled, having increased from 7.27 to 16.92 per 10,000 of the population over the age of twenty years. (2) That this increase is greatest at ages over forty-five, is common to both sexes, but more marked in the male sex, though the actual mortality is higher among females. (3) That in females this is chiefly due to an increase in malignant affections of the abdominal viscera. (4) That uterine cancer and cancer of the breast in females have increased, though not in any marked degree. (5) That cancer of the rectum also shows a slight increase in both sexes. (6) That in males the highest mortality is from cancer of the abdominal viscera. (7) That in males cancer of the mouth and upper digestive tract has also greatly increased. (8) That, therefore, cancer of regions which may be described as "accessible" has increased as well as that of parts which are not so accessible, and where the diagnosis is more difficult, but the increase in the latter is out of all proportion to that in the former class. (9) That during the same pathological diagnosis, as well as in death certification, and consequently a considerable diminution in returns from such in-period there has been a great improvement in both clinical and definite conditions as "old age" and "disease" of the various organs (without any specification of its nature). (10) That this must, to a considerable extent, have helped to swell the returns of death from "cancer." The writer does not think this sufficient to account for the great increase of cancer mortality. This increase is real and substantial, though not so great or alarming as the general public believe. To solve this problem of increase, we must have a more accurate knowledge of the life history of the organism which gives rise to it."

—(New York Medical Record, abstracted from the British Medical Journal.)

## Editorial.

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In this issue appears a paper by Edgar S. Ferris, M. D., of Henry, Ill., entitled "Hypertrichosis Produced by the X-Ray," which is a very interesting article. That the X-Ray stimulates hair growth has been proven by our German experimentalists several years ago, especially in Alopecia Areata. In these cases the hair was exposed to the ray until depilation occurred and then it was noticed that a more uniform growth appeared several weeks afterwards in about 50 per cent of all cases so treated. This proves positively that the first depilation acts as a stimulant. If now we treat hypertrichosis we must not stop at a stimulating stage, and this is what Dr. Ferris has done, but we must continue to treat once a week of from 12 to 18 months, and in some cases longer and oftener. Each treatment must be followed by a fair reaction; that is, redness of the skin, and then we may expect success. After depilation, I treat my patient once a week, using a mercury dip interrupter, low vacuum tube, current of 14 volts, 5 amperes, as follows; right side of face, 5 minutes; left side of face, 5 minutes; upper lip and chin, 5 minutes; then I lower the head-rest to raise the chin and treat the left side of neck 5 minutes; then right side of neck, 5 minutes. This has given me good results. One case 8 months after last treatment, which extended over one year, has no recurrence and the patient has a softer skin than before. In another case in which the last treatment was given 5 months ago, I met with the same good results.

A stimulant used to excess acts as a depressor, and that is the way to use the X-Ray in hypertrichosis.



During the last month the Associated Press dispatches have contained statements concerning the alleged injuries to the electrician, Thomas A. Edison and one of his assistants. A strong editorial commenting on this "new" discovery of the dangers in the use of the X-Ray appeared in one of the August issues of the Journal of the American Medical Association. We cannot forbear quoting in part from the editorial:

"According to the various newspaper reports, Mr. Edison's injuries are interesting. His left eye is out of focus, his digestion is upset and lumps have formed all through the region of his stomach. He knows it is the result of the X-Rays, because he held the tube close to his stomach when he was working with X-Rays five or six years ago. The disease from which he is suffering is of a most mysterious character, and no doctor is able to tell him anything about it; and he ought to have been able to find out, for among the many specialists he has consulted there is one man who has dissected more than four thousand bodies, and if a man who has made four thousand dissections can not tell you what is the cause of lumps in your stomach, who can?

"The injuries to Mr. Edison's assistants are of a much more tangible character. Without any doubt they have X-Ray burns, but there is nothing to indicate that the burns are not of the ordinary character of other X-Ray burns. It is probable that his assistant, whose arm had to be amputated, is one of the cases which have been recently mentioned in the literature of epithelioma developing in an X-Ray dermatitis of long standing. From the character of chronic X-Ray burns the possibility of epitheliomata developing in such injuries has been pointed out by Pusey, and cases of this sort have been reported by Allen and White, and others.

"If we are to believe the newspapers, Mr. Edison does not stop at recounting his strange experience, but readily offers an explanation for it, namely, that the condition is due to the action of the rays on the phagocytes; that the rays paralyze the active phagocytes without actually destroying them—all of which is somewhat bewildering. In view of the careful studies of X-Ray injuries that have been made by Scholtz, Grouven, Gassmann, Pusey and others, which show very def-



initely the changes that occur in tissues under the influence of X-rays, it would seem that his histologic discoveries are not of serious interest. He has, as far as can be judged by the newspaper reports, found nothing that has not been found before, and offered no explanation that is of any value. He is relashing in the daily press facts that had been learned by physicians through sad experience seven years ago. The whole thing seems to be a good deal like the promised storage batteries, a useful vehicle for publicity when propelled by the power of a widely known name."

We are glad that a journal of such high standing criticises the publication of such reports in the newspapers. Statements made by Mr. Edison will doubtless prejudice the public somewhat against the use of the Roentgen Ray, although the patient is never subjected to such long exposures. The physician and operator have now learned how to take care of themselves as well as the patient, and very few injuries now result from the rays.



#### NOTICE.

The thirteenth annual convention of the American Electro-Therapeutic Association will be held at the Hotel Windsor at Atlantic City, N. J., on Sept. 22-24. A very attractive programme has been prepared, embracing papers on the use of electricity, light and the X-Ray in the treatment of various diseases. We note with pleasure that many of the papers are to give detailed history of the cases treated, showing a desire to discuss methods of treatment in a very practical manner. The speakers, for the most part, will be well-known electro-theraputists in the East, and the meeting should be largely attended.

## Abstracts and Reprints.

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### SUGGESTIONS IN THE TREATMENT OF ADVANCED MALIGNANT DISEASES OF THE UTERUS.

BY ERNEST A. HALL, M. D., VICTORIA, B. C.

Fellow of the British Gynecological Association.

"Those of you who have come in contact with cases of advanced malignant disease of the uterus will agree with me that of all conditions submitted to surgical treatment this has proved the most disappointing. It is withal a minor chord that we are compelled to strike in the discussion of this matter. After many attempts with the most elaborate methods the surgeon must often admit defeat, and is able to offer only methods of palliation.

"Now, what can we do with the great proportion of cases who have been led to consult us from the foul discharge, and progressive pain?

"The answer will of course depend upon the condition. We must remember that malignant disease frequently increases rapidly in growth after being molested—probably on account of the opening up of fresh foci of absorption and irritation of the lymphatic elements, with consequent increased activity of the malignant cellular elements. For this reason, deep curetting is to be avoided; only the necrosed tissue must be removed. It is better, first, to apply caustics, which coagulate and destroy, thus sealing up the vessels. If there is periuterine infiltration, with any limit to the movement of the uterus or if the vagina and region of the bladder be affected, there is nothing to be done beyond the local cleansing, application of caustics, and general measures to relieve suffering.

"Surgical measures, other than mild curetting, are absolutely contra-indicated, in such extensive involvement. The patient will live longer, and suffer less discomfort, than when radical operative measures are attempted.

"Inoculation of the combined toxins of bacillus prodigiosus, and erysipelas has not thus far been successful.

"The X-Ray has relieved pain, but we have secured nothing more, so far, in these cases, from its application.

"It has remained to Massey to give us a treatment that apparently meets the indications in cases where the disease is still confined to the uterus and cervix, and also applicable, surgically, in all cases where radical measures are of assistance. His treatment is based upon the fact that during the passage of a galvanic current through the body decomposition of compound chemical bodies is caused—the acids accumulating at the positive pole and the alkalies at the negative pole; also, there is the actual transmission of liquids and solids (in solution) in the direction of the current: 'anodal affusion.' This can be shown by an experiment: Place two porous cups, equally filled with water, in a pan of water of the same depth; then pass the galvanic current, by placing one pole in each cup; in a few minutes, the water in the positive cup will be lowered, while the water in the negative will be higher. With a zinc or copper positive electrode placed in contact with the diseased uterine tissues, and the negative attached to a large abdominal electrode the oxychloride of mercury and zinc (or copper) is formed, which is transmitted through the tissues toward the opposite pole. Thus we obtain greater activity with the nascent chlorides, and a greater degree of penetration than by the ordinary method of topical application. Massey says 'the radiating stream of mercuric oxychlorides will be diffused to a considerable distance in decreasing density, depending in extent on the amount and duration of the current, and will produce a zone of sterilization in the cancer cells which succumb, while the normal cells show a mere irritative action.'

"The current required for the application of this treatment can easily be obtained in cities where the Edison direct current is used, otherwise a galvanic battery of from 20 to 50 cells will be necessary. The current which I use is a 500-volt direct, supplied by the B. C. Electric Ry. Co. By passing it through a bank of lamps, it is reduced to 100 volts; then through a graduated rheostat, with a milliamperemeter in the circuit. I use electrodes (preferably zinc), with a surface of

9-12C. and a felt abdominal electrode of 800C. The positive electrode must be sterilized by boiling; the zinc portion dipped in mineral acid, then into metallic mercury, then wrapped with cotton saturated with bichloride of mercury, and inserted against or into the uterus. With both electrodes in position, the current is gradually turned on to the extent of the patient's ability to bear, generally from 50 to 150 M. A., and continued for twenty or thirty minutes. This may be done daily if the patient can endure it. A removal of the fetor, and a cessation of the discharge are at once noticed, with a blanching of the surfaces and an apparent check in growth. But of course a cure cannot be thus secured in these late cases—merely prolongation of life and diminution of discomfort."

The above article appeared in the *American Journal of Surgery and Gynecology*. It is worthy of note that Dr. Hall is one of the few who adopt the method originated by Massey. We gave in our March issue a report of several cases treated by Massey. The method certainly seems worthy of wider application than it has received.



#### CARCINOMA TREATED BY THE X-RAY.

Cases Reported by Henry Perkins Mosley, M. D., in the *American Medicine*.

CASE IV.—Carcinoma of jaw. Service of Dr. A. J. McCosh. Mr. C., aged 62, was born in the United States and has been a missionary.

*History*.—About six months ago the patient had a small ulcer at the inner side of the left cheek, caused by the irritation of a sharp tooth. This persisted and increased.

*Physical Examination*.—April 28, 1902: At the angle of the left lower jaw there is a swelling about the size of a hen's egg. It is red, adherent to the skin and underlying bone

with a discharged sinus at its summit, from which comes a thin yellow exudate. Just above the angle of the mouth is a reddened nodule which is broken down and from which exudes a thick yellow discharge. On the inner side of the left cheek are a few reddened round hard nodules. On April 29, 1902, Dr. McCosh tied the left external carotid artery to cut off in part the blood supply to the tumor. The wound healed by primary union. On May 3, 1902, the Röntgen ray treatment was begun. The static machine or the coil was used to excite a low vacuum tube placed 20 cm. from the patient. The exposures were 5 to 10 minutes. Eight treatments were given on alternate days without any apparent effect. By May 16 the swelling in the left jaw had increased perceptibly in size in spite of the exposure to Röntgen ray. The patient left the hospital and died some time during the summer.

The case was most unsatisfactory for Röntgen ray treatment, as the growth had extended so far and was so badly ulcerating. The patient was failing perceptibly from day to day, and the treatment did not seem to have any effect on the local condition whatever.

CASE V.—Carcinoma of breast. The patient was Mrs. R., a widow of 49.

*History.*—This patient was referred by Dr. A. J. McCosh as having an inoperable tumor. Two years ago she first noticed a swelling in her left breast. She had no operation but had taken a course of treatment by subcutaneous injection in Boston.

*Physical examination* showed a large nodular heavy bluish mass in the lower part of the left breast including the axilla. There was no edema of the arm. The patient's general condition was fair.

*Treatment* was begun July 17, 18902. High and medium vacuum tubes were used, excited by the coil or static machine. Exposure was for 5 or 10 minutes at a distance of 25 cm. Seven treatments were given and the patient went to the country for two weeks. On her return July 28, 1902, she looked bad, the mass had grown and was ulcerating. The ulceration progressed rapidly and she soon became too weak to have further treatments. She gradually emaciated and died October 2, 1902.

This was a most discouraging case from the outset. She had neglected the disease so long that it was too late for any treatment to have results. The rapidity of the growth and its malignant nature were evident from the very first and it is another case in which the treatment did not seem to have any effect whatever.

**CASE VI.**—Recurrent carcinoma of breast. Service of Dr. Ellsworth Eliot, Jr. Louisa G., aged 52, was born in Danish West Indies, is a widow and colored.

*Previous History.*—In November, 1901, the patient was operated on by Dr. Eliot for a scirrhus carcinoma of the left breast of one year's duration. At this time the breast and pectoral muscles were removed and the axilla cleaned out.

*Present Illness.*—Ever since the operation the patient has suffered almost constant pain in the wound and shooting down the arm. About March, 1902, she noticed a little lump starting to grow in the region of the scar. This increased in size and has broken down, leaving an ulcer.

*Physical Examination.*—April 15, 1902: There were numerous nodules along the line of the scar, at no point being adherent to the chest wall but evidently in the skin. On April 18, 1902, Dr. C. A. McWilliams excised the scar and surrounding tissue, leaving a denuded area about eight inches in diameter. This was partly closed by freeing the skin and drawing it together, the remaining areas being filled in by skin grafts done at the time of operation. In about half the area the grafts were successful. On June 25, 1902, the note is: "Wound slowly granulating over. In the granulating area are a number of small elevated patches about the size of a pea, with eroded surfaces. Below the wound in the skin is an area about two inches by three inches consisting of similar nodules." (Attention is called to this area as reference is made to it later.) July 9: On discharge from the hospital wound is in the condition of last note.

*Treatment* was begun May 28, 1902, six weeks after the operation, and was kept up regularly until September 22, 1902. The static machine or coil was used to excite very low vacuum tubes placed 20 cm. from the patient. The exposures

were ten minutes, on alternate days. There was no burning produced. The patient's color prevented any change being noticed visibly, but she complained of no irritability and no sense of heat except once. By June 9, 1902, she had improved—the discharge was less over the granulating area, which was smaller. On June 30 there was slight recurrence at the lower part of the wound. This is the same as noted in the hospital notes of June 25. July 28, the granulating area was nearly healed. Place of recurrence was much better, it was not soft; there was no discharge, no puffiness. All these conditions existed until July 11. On August 11 she complained of a slight burning sensation over the wound. Treatment was continued, however, and no bad effects were noticed. She did not complain of the burning again, and three days later said it was absent. August 27: She complained of pain, and yesterday a mass of glands was noticed above left clavicle. August 29: Nodules were noticed in the right breast. September 20: Area skin grafted has broken out at outer side and also at inner side. October 13: She was seen in the Presbyterian Hospital dispensary; she coughs a good deal and has much dyspnea. This patient was last heard of as being too weak to come to the dispensary for treatment, and it is presumed she has succumbed to the metastases.

At first this case seemed very promising. The patient presented herself regularly, and at one time the treatment seemed to be doing her good, but the recurrence later appeared in the areas of skin grafted, and metastases appeared elsewhere. The area, however, below the scar did not seem to take part in the recurrence. This condition has been noticed that vigorous treatment on one portion of the body prevents, or apparently retards a recurrence here, but has no effect on metastasis elsewhere. The fact that the patient complained of no irritability of the skin, and that there was no evidence of dermatitis raises an interesting question whether the pigment in a negro's skin might not act as a preventive to a Röntgen ray dermatitis.

CASE VIII.—Carcinoma of inguinal glands. Service of Dr. A. J. McCosh and Dr. F. Tilden Brown. Mrs. S., a widow of 68.

*History.*—The patient has had five children, all normal labors. A small sore was removed from the right labium 2½ years ago at the Woman's Hospital. It was said to be an epithelioma.

*Present Illness.*—Nine months ago a small lump was noticed in the right groin, gradually increasing in size, and recently a small area discharging pus appeared at the outer part of the swelling.

*Physical Examination.*—June 23, 1902: In the right groin was seen a hard mass half the size of an egg. It was slightly tender, overlying skin reddened, and a small discharging sinus at the outer portion. Skin was adherent, swelling was not movable on the deeper parts. No other enlargement of the superficial glands was made out.

*Treatment* was begun on June 25, 1902, and continued on alternate days and daily until September 3, 1902. High, low and medium tubes were used, both the static machine and coil being employed to excite them. The distance of the tube from the patient was about 30 cm., the time 5 to 16 minutes.

Slight erythema was produced, but no curative effect whatever could be noticed, not even a diminution in the amount of discharge, and the patient becoming markedly weaker was discharged to the hospital to return to her home in the country.

CASE IX.—Carcinoma of inguinal glands. Service of Dr. A. J. McCosh. The patient was Mr. M., a Canadian, aged 43.

*History.*—Family and personal history are negative for venereal disease or neoplasm. January, 1901, a circumcision was performed in Ottawa for a small lump on prepuce, the pathologic report being epithelioma. At this time the right inguinal glands were dissected out. Recurrence took place and a second operation was done in June, 1901, at Ottawa. The swelling in right inguinal region again appeared, and a third operation was performed in Paris in the fall of 1901. In the middle of January, 1902, the patient noticed a return of the swelling in the right groin, and on admission, on February 8, 1902, in the old scar was an enlarged hard mass of glands. Those in the left inguinal region were palpable, but not enlarged. Dr. McCosh removed the mass, which involved



the ramus of the pubis and Poupart's ligament, and was adherent to the iliac and femoral veins, but "it was impossible to go wide enough of the growth to be sure of removing it entire." The wound was granulating well when patient was discharged in March, 1902. Dr. J. S. Thatcher's pathologic report was carcinoma. On March 24, 1902, Dr. S. S. Graber, the patient's family physician, referred him to me for treatment. The patient had noticed swelling and a sense of discomfort in the wound.

*Examination* showed the scars of a 4-inch incision, parallel to and over the right Poupart's ligament with a vertical one descending from its center about 3 inches long. At the junction of these two scars, which was markedly depressed, was a mass feeling like an irregular collection of small glands. It was firm—not fluctuating, and slightly tender. The left inguinal glands were distinctly palpable and enlarged.

*Treatment.*—With the idea of inhibiting the growth of the mass the Röntgen rays were applied. The tube usually employed was of a medium high vacuum, excited by the coil. The distance of the target from the patient was 20 cm. The area treated was about 6 inches by 4 inches. The length of the exposure was 5 or 10 minutes, depending somewhat on the character of the rays given by the different tubes used. At first the exposures were on alternate days. From April 2 to April 20 they were given daily, then until May 3 they were omitted, as the skin became a little red. From that date until May 23 the exposures were daily. He was seen last June 9, 1902.

The improvement began soon after the treatment was instituted. The mass grew smaller and the sense of discomfort disappeared, the patient's general condition improved and he gained weight. On June 9 the mass in the scar had entirely gone and the glands in the left groin could not be palpated. He reacted very well to treatment and with the exception of a very slight redness at one time the only disturbance to the skin seemed to be a marked pigmentation. There was no burning. On November 2, 1902, a letter from the patient's home in Canada says there is no evidence of a recurrence in the scar. He is still taking regular Röntgen ray treatment. The result in this case was most satisfactory. After his first

operation recurrence was noticed nine months later. After the second four months later. After the third four months later. The last operation could not be made sufficiently radical to remove the growth, but the Röntgen ray treatment certainly has seemed to inhibit its growth up to the present time at least and it is now nine months since the last operation.

A striking feature of this case was the disappearance of the left inguinal glandular enlargement while the treatment was being applied to the right groin.

COMMENTS.

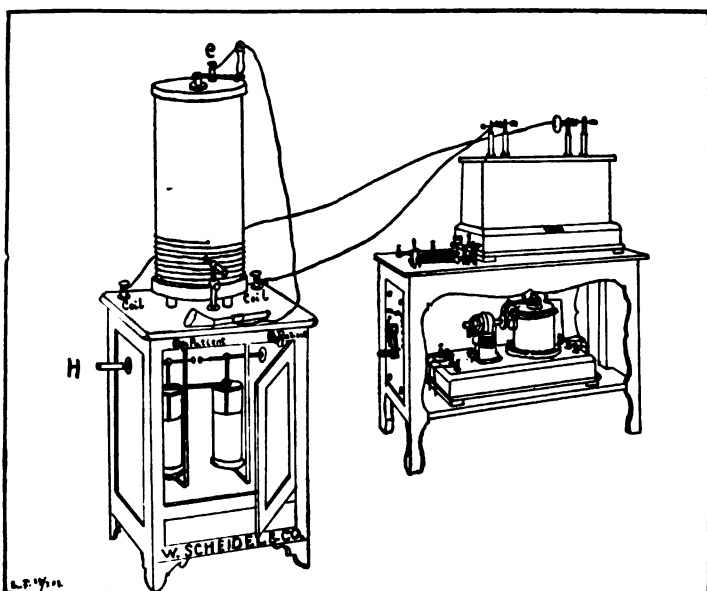
We give in full a clinical history of several of these cases because we believe our readers may have similar experiences. It is worthy of note how favorably some of the carcinomas first reacted under treatment, only at last to end in a fatal result, the patient dying of exhaustion. This fact reported by not a few operators, is certainly of great significance. Perhaps it is too early to claim as some do that the X-ray disseminates toxic material. The question may well be left open for a time, but every operator should keep histories of his cases. The technique of the treatment was reported in our July issue.



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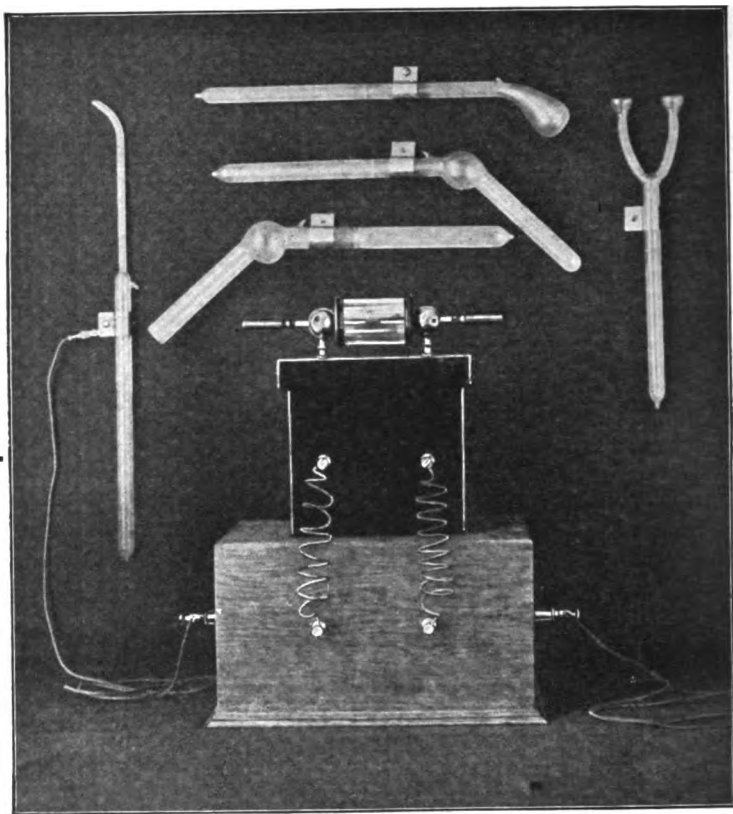
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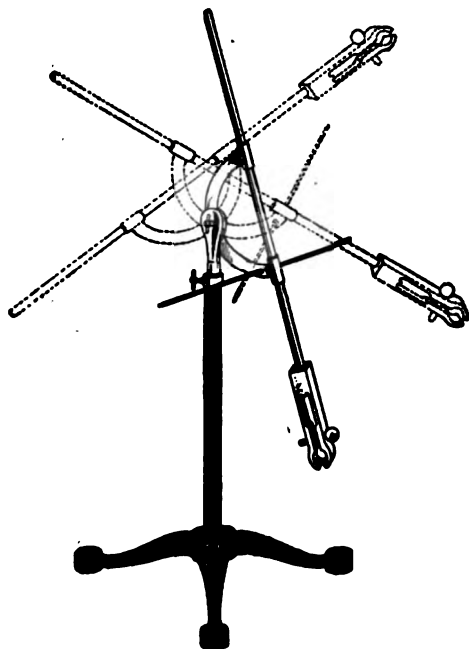
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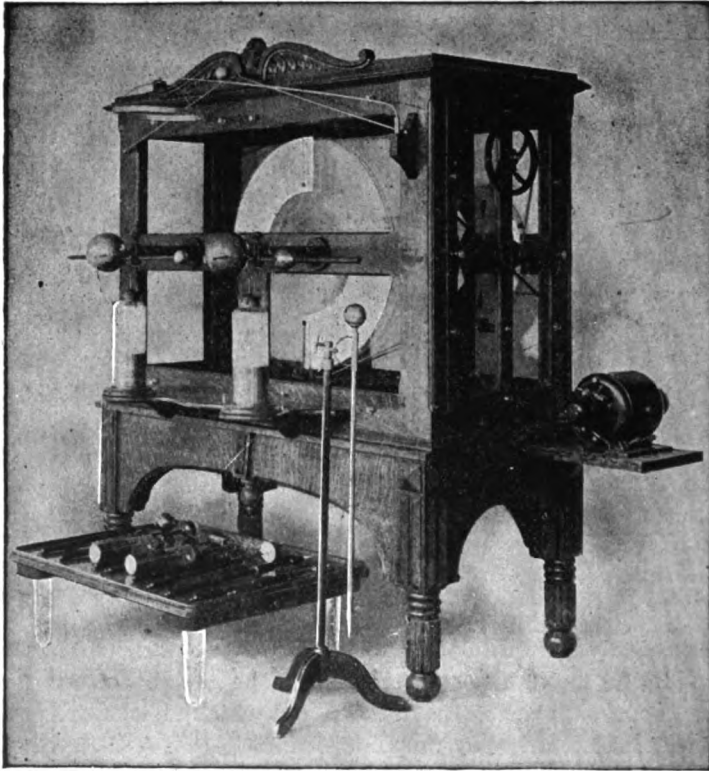
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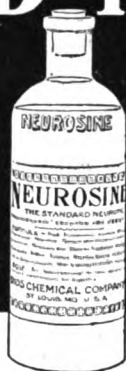
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No. 9

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## Original Contributions.

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### PROMISING OUTLOOK ALONG ELECTRO-THERAPEUTIC LINES OF PRACTICE.\*

By T. L. Barber, A. M., M. D., President of the W. Va. State Medical Association; Member of American Medical Association.

To the casual observer and cursory reader the progress and accomplishments of the medical profession are becoming well understood. In fact, the signs of the times denote a popular intelligence which no longer tolerates the overweening confidence that used to be reposed in the family doctor. By far too many of the profession are contented with the meager smattering of professional knowledge gained by a few months of study in a school willing to give a diploma to the knowledge gained by experimenting upon the confiding public and by a casual reference to a few medical books.

There may be isolated country districts that for some years to come will be slow to get the daily or weekly newspaper and where the all-round country doctor will still be permitted to use the same old nostrums and methods that the medical men of one hundred years ago regarded progressive. But the greatest of all popular educators, the newspapers and the magazines, are surging ahead and finding a place in every home where even a rudimentary education in the common schools has made it possible for people to study out the record of human events. Thus the world is becoming familiar with the knowledge of

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\*Read before the W. Va. State Medical Association.

how to live and of what constitutes disease and the advanced methods and means of combatting and preventing its ravages. To keep abreast of this popular knowledge the physician must be ready to meet its expectations with rational methods. The old-time swilling of drugs and nostrums for the relief of human ills is fast giving way to more scientific procedure, many of which the people are learning to apply without the medium of the physician—often because the latter is not fitted to administer them or direct their use.

These rational methods embrace electricity, light, heat, mechanical and manual massage and psychiatry. These with the proper diet and exercise, when scientifically applied, are able to relieve and cure many of the real and imaginary ailments of humankind.

We are not unmindful of what is being accomplished through these same agencies in the minds of charlatans and self-deceived sects and cults. We cannot "pooh-pooh" their accomplishments, though we cannot but condemn the dishonest, irrational and deceptive methods resorted to by them. None of these devices should receive the condemnation of the medical profession more unsparingly than that which comes out of the distorted interpretations of the Scriptures. These cults that pretend to rely on the divine to the absolute exclusion of all rational interpositions—while at the same time heaping unblushing ridicule upon these rational methods—are the greatest menace to scientific developments and human happiness. That the suggestive influence through them does actually cure many patients, after the indiscriminate use of drugs has failed, we cannot deny. But to the educated physician belongs the curative art, and no matter what the *modus operandi*, it must be stripped of *placebos* and other irrational media that must only excite the distrust of an intelligent community.

All well-informed physicians now acknowledge the value of suggestion as a therapeutic measure, and it should be taught and practiced scientifically and not used as a deceptive means, so that the dignity of the profession will be preserved and the respect of the intelligent seeker after health be not lost.

No therapeutic measure of this wonderful age of progress is attracting more consideration than electricity. Though our knowledge of the existence of this wonderful power or force

has been common to the world for a long time, and though man's ingenuity has been engaged in attempts to master it and use it, still how few years have elapsed since it has become an economic and perfectly controllable power—it being the ideal power, the ideal light, the ideal heat for domestic and commercial use, a powerful and effective disinfectant, deodorizer and oxidizer for the destruction of sewage, offal and excreta, and as a means of purifying the water supply of cities, villages and private dwellings.

In the curative art electricity is being employed in a great variety of modalities, depending upon the variety, density, voltage and numerous other conditions of this current.

Electricity is now recognized as having a very intimate relation to life processes in plants and animals. Their very life depends upon the electrical conditions that surround and are within them. Physiological action and electrical energy are interchangeable. How reasonable is it, then, to suppose that we are able to restore the disturbed equilibrium (disease) of the body by supplying it with electricity from without the body.

The nervous system (brain, ganglion and nerves) is but a battery of cells with its numerous nerves as insulated conducting cords along which the nervous energy, as the electric force, is conducted; the vibrations traverse the body in every direction through the axons, which are bare of insulation (the myeline sheath) before they leave the brain and ganglia, and also where the nerve is to attach to sensory organ or muscle. All space and all substances are permeated with that which, when disturbed in its equilibrium, manifests the wonderful power or force which we call electricity. This something which we call ether is set to vibrating by this disturbed equilibrium and the disturbances thus set up are shown in the electric spark and sensitive vibrations, as when friction and chemical action are resorted to.

The laws that govern electricity are as well known as any other natural law, and much of the mystery that has surrounded this power and vital force is dispelled.

The different nerves must be the seat of different vibrations to functionate the different organs which they supply; and then again, these vibrations must vary in normal and abnormal con-

ditions of the parts they supply. How delicately poised the eye and the ear and the sense of touch and smell and taste, and how intricate the mechanism of these organs to present the wide range of disturbances that they are capable of responding to! How familiar we are with the synchronous cords of musical instruments, which, when caused to vibrate, induce all of the same pitch or tension to vibrate.

Witness the wonders of Marconi's wireless telegraphy, which is based on this same principle of harmonic vibration, the receiver being set into electrical vibration by the waves sent out from the sending station.

How natural the conclusion that "Old Sol," the source of all earthly life, is disseminating the secret of life in such electrical vibrations as to suit the varying demands of the animal and vegetable kingdoms. How stunted and diseased becomes all life when deprived of this source of life!

From these few suggestions and the facts we know about this wonderful power, electricity, which indeed seems to be veritable life, is there a more inviting field for the physician than to study its application to the various maladies of human-kind? Nor is the application of this power or force to the cure and alleviation of disease an experiment. Though the great army of physicians is quite unacquainted with its practical utility and regard it as a natural phenomenon that excites wonder and fear, there are thousands of physicians all over the world who can testify to its wonderful remedial powers, and there are tens of thousands of suffering humanity that are living witnesses of this curative agency.

It is not sufficient evidence of ability to use this wonderful therapeutic force for the physician or the patient to be conscious of a passing current, though perhaps for certain psychic effects even that may have its value. While its irrational use may not always result in injury to the patient, surely the physiological and alterative effects of the various modalities of this agency must be well understood to secure intelligent results.

Any one can start a galvanic or faradic battery and make a static machine or coil bring forth breezes or sparks and may easily show the X-ray and produce something that will pass for the ultraviolet rays. Because of this fact, charlatans and partially educated physicians are using these means to gull the

public—a surprisingly large number of whom seem to still love to be humbugged—though doubtless many seek these pretenders with real ills that should have intelligent treatment.

To be conversant with the nature and modalities of electricity as a therapeutic measure and be able to get results must necessitate close study. When an attempt to use any of its modalities is undertaken by any one unskilled in this working knowledge no good is done and possible harm results, and a wrong is done to the profession which it will take long to undo. It has its place in every branch of medicine and surgery and should receive the consideration it is entitled to in all of these. In galvanism the intelligent use of this power depends upon an accurate knowledge of the polarity of the currents. In most of their physical and therapeutic properties the positive and negative poles are diametrically opposite. The positive is acid, sedative, generates oxygen and is vaso-constrictor; while the negative is alkaline, hypersensitive, generates hydrogen and is vaso-dilator. Living animal tissue is neutral or feebly alkaline, and as it dies or is in the process of exhaustion, naturally or by mechanical or electrical stimulation, it becomes acid. Inflamed or overactive conditions of tissue short of exhaustion becomes over-alkaline. These same conditions of tissue are brought about by the application of the currents of electricity. If these electric currents produce these chemical changes in normal tissue, why not presume that the normal electrical currents which at all times traverse the body are the forces that are foremost in the body's changes, and that without these polarizing currents no change can take place in the body and life itself must cease. In fact I am ready to believe that we shall ere long have positive demonstration that the drugs we administer to correct the abnormal conditions of the body do their work by establishing such chemical changes in the tissues as to restore the disturbed equipoise of the animal electricity that has caused said abnormality or disease. On such an hypothesis, how possible and rational are the electrical treatments to which we can subject diseased conditions in order to restore the normal conditions. So it is seldom necessary to employ any guesswork or empiricism in the administration of this remedy.



What an inviting field for study and practice, then, do we find in electro-therapeutics!

It would be interesting to refer to accomplishments along electro-therapeutic lines of practice, but it would tax your time too much.

There is a growing range of usefulness in the treatment of many diseases with electrolysis and cataphoresis, based upon the fact that most metals and salts of metals are either electro-positive or electro-negative, and any part of the body can have a direct application of such a drug when placed upon the proper electrode. Dr. G. Betton Massey of Philadelphia is achieving some remarkable cures through mercurial cataphoresis in cancer of the rectum, cases abandoned to die after repeated trials with other remedies.

How fascinating is the outlook in the static and X-ray fields of practice! In the former we possess a powerful function regulator, a fine stimulant and tonic whose broad field of usefulness and efficacy is daily being demonstrated. In the latter we have a new and as yet imperfectly understood force—the most remarkable therapeutic agent in the past ten years, whose wonderful therapeutic effects have startled the world. As a diagnostic agent it makes the once lost foreign body, the defective bony and organic structures of the body, as plain as any surface condition.

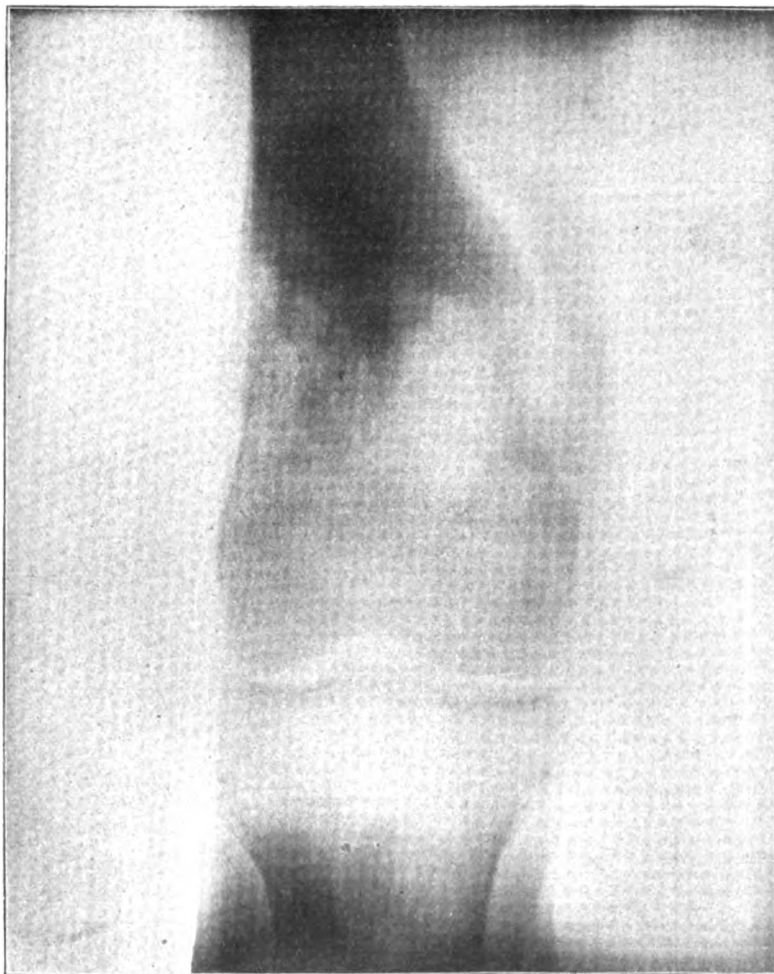
To realize all these hopeful outlooks in electro-therapeutic practice necessitates expensive equipments and untiring devotion to study of the subject, and to be envied is the man who is fixed and fitted to enter upon it.



**RADIOGRAPHS OF AN OSTEO-SARCOMA.**

*Taken in Cook County Hospital.*

The two views, antero-posterior and lateral, are reproduced from skiagraphs of a case of osteo-sarcoma involving the lower



end of the femur. The patient, Andrew B., aged 42, gives an imperfect, unreliable history. Claims to have first noticed about four months ago a tumor appearing in the right supra-orbital region. It grew rapidly and was followed about six

weeks later by secondary growths; one at the upper, another at the lower end of the right femur.



The skiagraphs were taken with a Scheidel coil and R. F. tube No. 11, medium low, at twenty inches distance, time 2 minutes. Ortol-hydrochinon separate solution developer.

KIRK SHAWGO, M. D.

## THE PHYSICS OF THE "MININ" RAYS.

### *A Correction to an Article in Our August Issue.*

I notice in the August number of your esteemed journal an article on the uses of the ultraviolet ray. I hardly know what to think about this article. The author's ideas about ultraviolet rays are a peculiar mixture of misconceptions and positive errors. I am sure that the author has never worked with the spectroscope and he certainly has not read Finsen's classical essays on "Chemical Light." My admiration for Finsen and his immortal work prompts me to offer these few lines in defense of Finsen against well-meaning but ill-informed amateur-phototherapeutists.

The writer of the article makes this statement on page 290: "Hence it is deemed necessary to-day to get the best results in smallpox that the patient be confined in a room having nothing but red rays of light." To say the least, this statement is misleading. The writer seems to think that the presence of the red rays is the curative factor in the treatment of smallpox and the prevention of pitting. The red rays *per se* have nothing to do with the case. The idea is to *exclude the chemical rays*. This being done, it makes no difference what rays are admitted. In filtering the solar spectrum red neutralizes the chemical rays and in this way helps to eliminate the destructive elements of sunlight. This is all there is to it. (See Finsen's article on "The Elimination of Chemical Light in the Treatment of Smallpox.")

On page 291 the writer speaks of ultra-red rays. There are no such rays. He evidently means infra-red rays.

On page 292 the writer speaks of "ultraviolet glass." I wonder what he means by it. The term "*ultra-violet*" specifies the spectroscopic location of the invisible portion of the chemical band. Being situated *beyond* (ultra) the violet band, these invisible chemical rays are called *ultra-violet* rays—i. e., rays *beyond* the violet band of the spectrum. Ultraviolet color does not exist because the ultraviolet rays are invisible. The vibrations of these rays are too rapid and short to engage the molecular elements of our visual apparatus. In view of these facts I am utterly at a loss to know what the writer means by "ultraviolet glass."

The writer's statements about the so-called Minin-rays are one continued unintentional misstatement. To begin with, Minin-rays have nothing in common with Finsen-rays. Finsen-rays are the concentration of the actinic and the ultra-actinic fields of the solar or arc-light spectrum. There is but little difference between the spectrum of the sun and that of the arc-light, the real difference being one of degree of intensity, but not one of spectral analysis. The spectrum of the incandescent light of Minin is almost entirely lacking in chemical (actinic ultraviolet) rays, but rich in thermic (red) and moderately endowed with luminous rays. Whatever chemical rays emanate from the Minin reflector are largely absorbed by the glass-globe. The Minin apparatus is distinctly a heat producer and all of its therapeutic effects are due to the thermic rays, supported by a moderate supply of luminous rays. The heat rays relax the arterial walls, increase the arterial blood supply, augment oxygenation and stimulate the metabolic functions of the affected region. In this way they promote excretion of foreign material and stimulate granulation. Their alleged germicidal action is due to the regenerating influence of oxygen in the arterial blood. The Minin apparatus does not perform its work through the ultraviolet rays, simply because it does not produce any. It is not a modification of Finsen's apparatus. It has nothing whatever to do with it. It would be just as logical to consider an acetylene lamp or a bonfire modifications of Finsen's apparatus. They all produce light of some kind. That is the only point of resemblance.

The Minin apparatus has a sphere of usefulness of its own. As an anodyne it is excellent. In rheumatism, lumbago, etc., it is an indispensable adjunct to the treatment. It will cure indolent ulcers, acne and various skin troubles. I am not prepared to say that it will do any good in genuine lupus cases. There have been cases recorded in which the Minin ray did the work. I rather question the diagnosis in these cases. I believe that they were cases of indolent ulcer and not of lupus. I use the Minin apparatus and Finsen's device every day. There is hardly a subject I am more familiar with than the clinical and physiological indications of these photo-therapeutic methods. In conclusion I beg to state that Minin was never a pupil of Finsen. Minin is professor of military surgery at

the University of St. Petersburg and senior surgeon of the imperial guard. He is a much older man than Finsen. Minin at no time refers to his thermic rays as being chemical or ultra-violet rays. Both Finsen and Minin are great photo-therapeutists, but have labored in the interests of two entirely distinct parts of the subject.

In subjecting the article referred to to criticism I did not mean to refer to the author in a disparaging way. He, like many others, is the victim of the chaotic condition from which the knowledge of modern photo-therapy has as yet not emerged.

OTTO JUETTNER, M. D.

Demonstrator of Photo-Therapy at the Cincinnati Post-Graduate School of Physiological Therapeutics.



## THE ROENTGEN RAY IN THE TREATMENT OF LUPUS.

### *The Early Work of Dr. Schiff.*

In a dissertation by Dr. Schiff before the sixty-ninth convention of the German Natural Scientists and Physicians at Braunschweig he dwelt upon the encouraging results attained in the hospital at Eppendorf from the application of the Roentgen ray treatment, such as are herein described by Dr. Gocht, assistant surgeon to Dr. Kümmell, principal of the New General Hospital in Hamburg. It appeared that a number of cases had been reported shortly after the discovery of X-rays by Professor Roentgen of Würzburg in 1895. Drs. Schiff, Freund and other eminent practitioners had treated lupus vulgaris and other cutaneous diseases with X-rays. The following is that of a young man R., aged 20, who is not tainted

hereditarily with abnormal affection, had always enjoyed good health. He first complained of illness in January, 1895, and from that time on was constantly under medical treatment. During this period several inefficient attempts were made to excise the lupus with sharp spoon and iodoform indications, also through cauterization with the paquelin, and as well as acidulous etchings, such as nitric acid, etc. In 1896 the patient was treated with tuberculin in small doses. Fever became often apparent, an angry red zone became visible at the edges, while painful swellings of a gland between the shorter plates were manifest.

About one cm. below the nasal root the nose is diffusely colored in small red nodules. Upon the middle part of the nasal bridge on the side part of the nose, into the naso-labial folds and upon the septum narium about  $\frac{1}{2}$  cm. wide upon the upper lip, overreaching and diffusing itself into the nose, these small nodules ranged in size of millets to that of a pea. The nodules upon the nasal bridge and those of the left nasal wing are to some extent softened and exuding purulent matter, while some are of bloody epidermic scales and thick scabs consisting of dried secretions. The lower third of the nasal bridge and the extremity of the nose are relatively free from taint of disease.

The treatment of the patient P. consisted in placing him upon a table. A leaden mask was affixed about the face with an aperture for allowing the X-ray to play upon the parts affected. The tube was placed some 25 cm. above the face. The pressure of the current did not exceed 20 volts and the amperage not more than 5 amperes. The daily continuous applications to X-ray exposures were from 20 to 30 minutes. The patient experienced no uncomfortable sensation during the treatment. On the 4th day of April, 1896, about the seventh day after the beginning of the application of the X-rays, a distinct reaction manifested itself in the form of a very highly colored blotting of the parts exposed to the X-ray and quite conformable to the aperture cut out of the mask. On the 8th day of April a highly suppurative and purulent dermatitis was developed.

This treatment was now arrested so that the dermatitis might be healed up. After a complete recuperation of the in-

flamed processes a marked improvement of the original disease could be noted. In place of the ulcerated, morbid growth of the lupus a new and healthy cuticle became apparent without exhibiting any scars.

The previously noted nodules were partially obliterated and dried up. But it was not deemed that a complete cure had been manifested, hence the treatment was continued in the manner aforesaid. The moment when the reaction became too violent and a new dermatitis was anticipated the X-rays were invariably set aside and again only applied when the inflammatory symptoms had subsided. This procedure was continued for eight months, inclusive of the several pauses when no X-rays were administered.

We now observed a slow but constant abatement of all lupus morbidity. The nodules became more and more contracted and finally disappeared entirely. The acute inflammation of the skin which we observed in the beginning did not return. As a reason it seemed not that the skin was not disposed toward an inflammation and because we guarded that no reaction should exceed the condition of a general hyperaemia. Nor were there any disorders noticeable.

The next case is that of a woman aged 48, with no heredity anomalies. Suffered 17 years with rheumatism, otherwise healthy. Patient complained since past two years with the growth of nodules upon her right cheek and ulcerations issuing from the right nasal orifice. The right side of the cheek is covered with angry red blotches the size of five-dollar gold pieces, while the to be infiltrated nodules at their peripheries appear less disseminated, and otherwise falling away with the inflamed decadence. Another nodule the size of a penny is noticed at the corner of the mouth, while a number of similar nodules appeared on the septum narium and adjoining part of theiltrum of the upper lip. The affection penetrates from the right side of the septum narium into the interior of the nose. Two extensively large swellings of glands are noted on the neck in the region of the submaxillaries, which are quite hard. The treatment, as stated above, began on the 20th of May, 1897. On the 25th, or fifth day thereafter, the reaction showed the highly colored parts of the exposed surface under the X-rays, which became quite acute about June 6 and turned



into a severe condition of dermatitis. The X-rays were stopped and alternately resumed after the subsidence of the dermatitis and continued this treatment for six months, and finally attained the same results as in the case of R.—i. e., the gradual diminution and shriveling of the nodules and securing a healthy skin to the patient. The swollen glands on the neck also subsided and gradually became normal.—*Translated from Fortschritte auf dem Gebiete der Roentgenstrahlen.*



# ANSWERS AND OBJECTIONS TO DR. A. A. O'NEILL'S PAPER, "X-RAY ERA," JULY NUMBER, ON ELECTROLYSIS IN URETHRAL STRICTURES.

BY ROBERT NEWMAN, M. D.,

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In the July number, 1903, of the *American Electro-Therapeutic and X-Ray Era* appears a flourishing article by A. A. O'Neill, M. D., of Chicago, in which the author wishes to show

that electrolysis cannot be successful in the treatment of urethral strictures. We only agree with him that it needs an expert operator in that particular line to succeed, and neither myself nor anybody can be made responsible for blundering attempts. A good surgeon may not be an electro-therapeutist and utterly fail with electrolysis for want of experience and knowledge of the first principles of physics and chemistry. The writer, in his articles, has often warned that persons who do not understand the method and have only heard or read about it should not attempt the performance of electrolysis. It is impossible to illustrate here in a limited space the fallacies of the paper, and it must be stated here that the success of electrolysis in the treatment of urethral strictures is certain and fully established, for which the writer offers the following facts and quotes the statements of others as follows:

The following is from an editorial in the *New England Medical Monthly*:\*

"Not long ago physicians and surgeons of repute flouted the treatment of urethral strictures by electrolysis. Now it is so generally and successfully practiced that scarcely any one opposes it. This change of opinion is undoubtedly due first to the better understanding of the electrolytic treatment as distinguished from galvano-caustic.

"The successful treatment, without relapse, of a large number of cases is fully reported by many physicians of high repute.

"It is undeniable that the method now adopted was first grasped and put forward by Dr. Robert Newman of New York, who, despite the misrepresentations and abuse of the ignorant, has zealously labored for eighteen years to perfect the instruments used and the technique of the operation until by extraordinary success the most skeptical are convinced. Experiments in the treatment of strictures with electricity have been made since 1847, and until 1872 without any method, except such as destroyed tissues by too strong currents. Mallez and Tripier called their method galvano-caustic, showing

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\* "What Is the Present Status of Electrolysis in the Treatment of Urethral Strictures?"—*New England Medical Monthly*, December 15, 1887.

that they used a current with caustic, not electrolytic action, and therefore they naturally failed.

"The present method is electrolysis, with weak currents applied at long intervals, resulting in galvano-chemical absorption, known and recognized as Newman's method. Newman also introduced and perfected instruments for use in the operation so that failure in the operation is hardly possible."

In England eminent surgeons so fully comprehended and acknowledged the great value of this method that it is taught at the medical schools as one of the ways of treating urethral strictures. In St. Bartholomew's Hospital an additional department has been established for treatment in this way, and many successful cases have been reported by Drs. W. E. Steavenson and W. Bruce Clarke.\*

"Like all of his recent papers, this one of Dr. Newman's is interesting, and there are a considerable number of men who share his views and approve of his method."

Dr. G. N. Rohe, Baltimore, said:†

"Dr. Robert Newman of New York has been the most prominent advocate of the method, but the treatment by electrolysis has won for itself a place in genito-urinary surgery which it will maintain. The evidence in its favor is too strong to be ignored."

Dr. W. E. Steavenson‖ says, Cantal gives in his text-book the subject particular attention, and says on page 76, "During the last decade it has been developed and improved by Dr. Robert Newman of New York to such an extent that it has now become one of the recognized modes of treatment of strictures." In his book he gives a full description and the success of electrolysis of stricture on pages 76, 88, 91, 116, 149, etc., and also in the treatment of gynecological cases.

Debedat‡ and many French surgeons conclude that electrolysis is a truly curative procedure as regards urethral stric-

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\* Medical and Surgical Reporter, Philadelphia, June 8, page 695.  
Editorial—Medical and Surgical Reporter.

† Atlanta Medical and Surgical Journal, July, 1888, page 296.

‖ "The Uses of Electrolysis in Surgery," by W. E. Steavenson, London, J. & A. Churchill, 1890.

‡ British Medical Journal, January 22, 1898.

tures, which are by it attacked alone without injury to the healthy urethra. None of the cases hitherto observed have called for further surgical treatment.

Dr. C. S. Neiswanger's remarks at a clinic in Chicago † at the Illinois School of Electro-Therapeutics—"organic strictures located in any part of the body can be successfully absorbed by electrolysis. There is a certain technique laid down for the treatment of these cases by my friend, Dr. Robert Newman of New York, and I find that just as long as I follow that technique just so long do I have results similar to these recorded by Newman. Just as soon as I deviate from it I do not have the same good results."

Editorial—Charlotte Medical Journal:§ "If, however, an operator is ignorant of the technique and instruments he certainly is liable to do all the mischief possible."

Similar remarks from editorials and authors could be quoted ad infinitum, and it certainly proves that many have had success with electrolysis in urethral strictures.

Now a few words of the writer's statistics. He has used his method of electrolysis for thirty-six years and cured thereby 2,500 cases, without having heard of a failure or relapse. He also, years ago, compiled 1,755 successful cases in the practice of fifty-four different operators.||

In the same number of the Journal in which this was published appeared an editorial, from which the following is quoted:

"The statistics accumulated by Dr. Newman would cover a list of over 2,000 cases of urethral stricture treated by the electric method. In the face of such a mass of positive evidence one is tempted to explain the dissent existing by the application of the personal equation. Still, every one has his right of opinion and free expression, and if the opponents of this method desire it, the columns of the Times and Register are equally at their service." No statements of dissent have been made.

Statistics each of series of one hundred cases have been pub-

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† *The Medical Standard*, 1900, and *The Critic*, September, 1902.

§ *January*, 1903.

|| *Times and Register*, Philadelphia, April 8, 1893.

lished in detail with documentary evidence. These statistics, letters and documents have been investigated by a special committee. This committee have pursued their investigations for nearly a whole year, very carefully and impartially examining the documentary evidence, read the letters concerning it, corresponded with former patients and their physicians in America and Europe. The final report made in the transactions of the American Electro-Therapeutic Association for 1893, page 40, was, verbatim, as follows:

"We have examined the records of Dr. Newman's cases and regard his conclusions as well sustained by the statistics, and as far as our experience in this line of work adds further testimony it is confirmatory of the value of the continuous currents in resolving a large class of urethral strictures," etc.

This report is signed by Drs. A. H. Goelet, Wm. J. Morton, New York, and W. J. Herdman of Ann Arbor. That under some circumstances some medical critics throw doubt on the correctness of the statistics appears almost a willful libel. Many of these patients have been kept under observation, and have been re-examined after years, and no relapse followed. Most of these, after twenty-five years' interval, can be found to-day stating that they have been kept well without having had a relapse. In a few instances a patient returned after years with a new ailment, mostly of the prostate or bladder, but never had a stricture in the same place which had been cured by electrolysis. During these years the writer has never lost a patient by death while under treatment for a stricture. Death, however, followed in every instance when a patient gave up the electrolytic treatment by the writer for the sake of undergoing an urethrotomy, which in these cases was never performed by the writer. Dr. F. B. Bishop of Washington, D. C., has reported more successful cases in the *Virginia Medical Monthly*, June, 1893, in which he says: "After a constant experience of eight years, I am thoroughly convinced that the treatment of stricture of the urethra by electrolysis is the best method now known to the profession." In another part of that article Dr. Bishop says: "Dr. Newman of New York has used this method about twenty-six years, and during that time he has treated numbers of cases with uniform success. Leading surgeons throughout the country have been severe in their

criticisms of Newman's method and have cast a shadow of doubt upon the claims of Dr. Newman. On the other hand, he has been supported by many men of prominent standing in the profession, both in this country and in Europe, who have taken the trouble to become familiar with the method and have practiced it successfully. Some of the critics, I think, have been unfair to Newman, inasmuch as they are hardly inclined to give him credit even for sincerity in the report of his cases cured, but content themselves with a wholesale condemnation of his method because they have tried it a short time and failed to cure their cases."

This should be evidence sufficient to establish the success of electrolysis in the treatment of urethral stricture. The writer will refrain from aggressive personalities in treating a strictly scientific subject, but defend himself against the unjust attacks made by Dr. A. A. O'Neill. On page 240 is a statement that dissolution of tissue is the result of chemical galvanocaustic. That is true when improperly done. If properly performed, however, any caustic effect must be avoided and the technique conducted in such a manner that only an absorption is caused without a caustic effect. Next he speaks of an irritation, which the writer has always advised operators to avoid.

The dangers described on page 242 can only occur in the experience of a tyro, and never with an able expert. Inexperienced practitioners should never attempt an operation they do not understand. The tirade about cicatricial tissue on page 243 is superfluous, as the writer never has spoken of it in his articles, nor caused cicatrices. Their removal is an art which may be accomplished only in certain cases and by experts. This, however, is not under consideration. On page 244 is an insinuation as though the writer claims the invention of electrolysis. On the contrary, he has given a full history and wonders that any practitioner is ignorant of the effects of electrolysis, which are described in every text-book on physics. He has mentioned all the efforts made in that direction, but certainly claims the originality of his method, technique and the instruments made for the proper execution of the method.

The language of Dr. O'Neill is extremely unfair and insulting, and if he had read former articles of the writer he could not have made those statements. On page 245 are similar un-

fair statements. We will not discuss the experiments of Dr. O'Neill. The cases he reports are the most unfair statements that can be imagined and cannot be convincing. The patients have all been under treatment with electrolysis by other practitioners, and they may have been good surgeons, but he does not show that they understood the effective technique of electrolysis in the treatment of strictures or in gynecology. In the very meager history of the cases we find one case of a probable prostatic disease. Case 2—Troubles may be caused by a catheterization. In case 3, an undue force has been used. Case 4 was treated for a long time by two different operators. Case 5 appears to have been handled badly. This as well as some of the following are gynecological cases, which to consider would be unfair and take up too much space. Next Dr. O'Neill assails the writer's veracity in a case reported by Dr. Tuttle, which many lawyers may declare a criminal libel. The reader may be informed that the specimen in question of a former rectal stricture, operated by the writer, was presented at a meeting of the N. Y. Pathological Society, and all the members present on that occasion did examine it and found it as represented. Hence it is reported accordingly in the minutes of the society.

It is beyond comprehension how a gentleman could make such unfair and deliberately insulting statements. There may be another object and the writer does not feel inclined to throw dirt or to be personal in scientific matters. The unbiased will conclude that electrolysis as a chemical absorption is a fact which will and must succeed in the treatment of urethral strictures.—*Journal of Advanced Therapeutics.*

465 Lexington avenue, New York.



## EFFECTS OF ELECTRIC CURRENTS AND SO-CALLED LIGHT RAYS ON BACTERIA.

The declaration made in a modern text-book that continuous electric currents are bactericidal is one that requires considerable modification inasmuch as it is capable of causing a vast deal of mischief. While the statement may be partially correct, various observers have demonstrated that degree or quantity is a factor which claims recognition in an estimate to determine the bactericidal power of the electric current.

In 1901 Zeit conducted some very thorough experiments by which he demonstrated that bacteria of low thermal death rate were killed by exposure to currents from two hundred sixty to three hundred twenty milliamperes for ten minutes, but that a current of forty-eight milliamperes has no bactericidal effect, even if continued for two or three hours. On the other hand, currents of one hundred milliamperes will kill non-resisting bacteria "by the production of electrolytic germicidal products" if continued for seventy-five minutes.

Electrodes are rarely sterilized between employments in routine practice; indeed the construction of these appliances is usually such that the only reliable method of sterilization—boiling and steam under pressure—cannot be utilized. In genito-urinary work the most essential precaution is to prevent the introduction of septic material into the genito-urinary tract. Currents of the strength mentioned are certainly seldom, if ever, applied to the region designated, as only a few milliamperes are required to disrupt a stricture. The irritation produced by electric currents constitutes a focus for infection, which is almost certain to occur if the electrode is not aseptic. Happily this method of treatment is fast being relegated to oblivion.

"The continuous current produced by polarizing electrodes and the exclusion of the effects of ions is neither bactericidal nor antiseptic." Tesla currents also prove negative as regards germicidal properties "when passed around a bacterial suspension within a solinoid." Ozone, when brought in contact in sufficient quantity, destroys bacterial life. The amount necessary to cause death may be obtained from high-frequency coils or from so-called brush discharges. The X-rays will kill many



varieties of bacteria in plate cultures, providing the exposures are continued twenty to thirty minutes. Ultraviolet rays, as is now quite well known, are bactericidal. In the treatment of lupus vulgaris, according to the specifications of Finsen, the patient is subjected to ultraviolet rays for an hour and ten minutes, on successive days, until an apparent cure is effected. The patient is requested to report any manifestations of recurrence of the condition, and the claim is maintained that only one or two per cent of six hundred cases of lupus vulgaris treated at Copenhagen have resulted in failure, the greater number of which were attributable to faulty treatment.—*Editorial Comment in the July Physician and Surgeon.*



## THE TREATMENT OF MALIGNANT DISEASES BY ELECTRICAL METHODS.

*A Discussion Before the British Medical Association.*

The president, Dr. H. Lewis Jones, took a conservative position regarding what had been really proven: "In looking through the published records of the use of the X-rays in cancer one cannot help feeling surprised to find how few of the alleged successful cases have been so recorded as to carry to those who read a reasonable conviction of success, and this, too, in spite of the fact that numbers of people are working at this subject and scores, if not hundreds, of cases have been treated. Half a dozen cases of unmistakable cures of undoubted cancer, if minutely reported, would be worth more just now than any number of vague statements about partial improvement, favorable effects and the like. The more one examines published statements the more suspicious one becomes. In most of them there is some flaw in the evidence. Either the diagnosis is uncertain or the patient is not more than partially relieved at the

time of writing, or he has been so unfortunate as to die from some intercurrent disease. It is greatly to be wished that all medical men who have recorded favorable cases will periodical-ly supply further notes of the later progress of their patients. In short, while there is a quantity of evidence to support the contention that the X-rays act beneficially in malignant disease, the amount of evidence to show that cures have resulted is lamentably meager."

The writer suggests a possible explanation for this failure of complete cure as due possibly to some fault in the technique, to the choice of cases or to some fundamental condition which is at present entirely unknown. Regarding the technique he raised the question whether the high tube or the low tube should be used or whether we must learn that some tubes do not give out the curative rays, even though the vacuum may be the one desired. It is also possible that failure is due to a lack of perseverance in the treatment. Another unsettled question is whether or not it is desirable to cause a dermatitis. Observers differ very markedly in their views.

Personally he recommends that all the opaque masks should be avoided, because these might prevent the rays from reaching some remote focus of the disease. He uses a medium tube with the anti-cathode red-hot. He avoids dermatitis. He treats the patient three, four or five months. The primary growth should be thoroughly excised and then the ray treatment should follow immediately. In the discussion which followed a number of the members reported that their cases were progressing favorably, and there is every reason for hoping an ultimate cure. Several spoke favorably of the high frequency current and the static treatment, although no detailed cases were reported.



## Editorial.

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We print in full the article that appeared in the August issue of the *Journal of Advanced Therapeutics*, by Dr. Robert Newman, in answer to Dr. O'Neill's article of our July issue. It will be of interest to those who are using galvanism in the treatment of strictures. We should be very glad to promote a free and thorough discussion of the subject. We certainly are inclined to state that two thousand five hundred cases of strictures cured by any agent and vouched for by impartial observers would be as fine a confirmation for a method of treatment as could be desired, and if the galvanic treatment is so uniformly successful, then there is no excuse for the employment of surgical means, to be followed by a long course of dilation.

Unfortunately, however, the genito-urinary specialists do not seem to be using this method, and, in fact, have concluded that it is not as efficient as dilation or urethrotomy. Thus Keyes and L. Bolton Bangs of New York both condemn the method, Dr. Keyes having tried it in conjunction with Dr. Newman, as reported in Rockwell's *Treatise on Electro-Therapeutics*, page 574. In future issues of our journal we shall endeavor to obtain statements from other genito-urinary specialists concerning their results in the use of the galvanic current, or abstracts from their published papers. Dr. O'Neill will reply to Dr. Newman in our next issue. We shall welcome also fully detailed reports of such cases.

An electro-therapeutic journal should aim to establish the truth in this field of medical research and practice. We are not hostile to the use of galvanism. On the contrary, this journal would be only too glad to have it thoroughly established, but we are unwilling to let any personal regard for electro-therapeutics lead us to advocate a measure which has been found wanting by most of the recognized authorities.

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It is very interesting for the radio-therapist to contrast the favorable comments given to the therapeutic work of radium by the conservative journals as compared with their judicious stand with reference to the uses of the X-ray. Let us wait for the same length of time before saying that this new agent should be used for other than experimental purposes. Already one drug firm has advertised "radium bulbs for the treatment of cancer, lupus and other diseases and for experimental work." In the field of physics, however, radium is of very great interest and value in broadening our knowledge of radiations and possibly in furnishing one more proof of the divisibility of the atom. It was indeed a bold conclusion arrived at by J. J. Thomson, after much experimentation, that in the cathode stream we have a swarm of corpuscles into which the atoms of the gas of the tube have been divided. It has already been proved that the radiations from radium consist of an "emanation" which can be condensed at very low temperatures and which, therefore, seems to be matter instead of radiant energy. Various scientific journals contain reports of this work which show that we are soon to have our knowledge of electricity and of matter much extended.

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NOTICE.

The first regular meeting of the Chicago Electro-Medical Society after the summer adjournment will be held in Room 301, Schiller Bldg., Tuesday, Sept. 29, at 8:15 p. m. A paper will be read by Dr. Noble M. Eberhart on "The X-Ray as a Beautifier." All members should be present.



## THE VALUE OF THE STATIC MACHINE AS A THERAPEUTIC AGENT.

By H. N. Chapman, M. D., in the *Courier of Medicine*.

The author compares the voltage and amperage of the galvanic and faradic currents with the discharges from a static machine, showing that in the galvanic current the voltage is lowest and the amperage highest; in the faradic current the voltage is increased and the amperage correspondingly is diminished; in the static discharge the voltage is very high and the amperage only a fraction of a milliampere. He also contrasts the therapeutic uses of these three forms of electricity; galvanic current for chemical effects; the faradic for muscular contraction; the static current for functional effects.

He notes the following symptoms exhibited uniformly by the patient under static treatment: Deeper breathing, marked tendency to perspire after fifteen or twenty minutes the atonic sedative effect—for a fidgety person becomes quiet and distinctly sleepy. A great amount of oxygen is absorbed and carbon dioxide exhaled. A greater amount of urea is excreted in the twenty-four hours, though the volume of urine is not increased. The digestive functions are stimulated and the appetite good.

### EFFECT OF THE DIFFERENT FORMS OF STATIC TREATMENT.

The breeze and spray affect the vaso-motor nerves; capillaries contracted, temperature of skin reduced. The respirative processes in skin diseases are increased. These treatments also stop pruritis and relieve pain. The pain of carbuncle was relieved and the patient gained sleep after fifteen minutes spray over the affected part.

The spark treatment produces the deep contraction of the muscles if the spark is given over a motor point. At first the capillaries are contracted, then afterward dilated. Chronic pains are relieved, old exudations are caused to be absorbed and stiffened joints are loosened up.

### HISTORY OF A CASE.

H. C., aged 55 years, became a confirmed neurasthenic two years ago, with frequent suicidal inclinations, especially desiring to kill himself with a shotgun. He had traveled seeking

health, and during the past eighteen months had been treated by one of our best general practitioners. He was urged by his friends to come and take electrical treatment, but was prejudiced against it and refused. Finally, to relieve himself of their solicitations, he spoke to his physician about it, and was informed that electricity was not suited to his case and under no circumstances to take it. This silenced his friends and the matter was allowed to drop for six months. At that time, a little over a month ago, I was called to see him. I found a man, elderly in appearance, of spare habit, in bed, where he had been for twenty-four hours, languid, falling away into a dozing condition, but easily aroused. The pulse was rather slower than normal, temperature normal. The heart and lungs gave negative results; the tongue was furred, bowels constipated, skin dry; appetite variable, digestion not good. The slightest mental or physical exertion caused his mind to become chaotic and he could not then concentrate his attention on the subject in hand.

He wanted to know what electricity would do for him. I told him to come and see me and I would ask him to give me a trial every day for one week, and then three times a week for three months, and if at the end of that time he was not materially improved I would not continue treatment. He was not able to get out for a week after I saw him, and then he came.

I began treatment and pursued it vigorously (using the wave current applied over the epigastrium or lumbar and sacral, or cervical and upper dorsal), and in four weeks, in all about fourteen treatments, he has been enabled to go back into his office and take up his business, that of a title examiner. Every function has been restored. He has an appetite, as he says, like a horse; digestion normal, bowels perfectly regular and the stools normal in appearance. He sleeps soundly all night and wakes refreshed. His mind is alert and active; grasps the problems of a title and no sense of confusion or mind weariness.

Last Monday, just four weeks from commencing of treatment, he went to the courthouse and worked from 8 a. m. until 2 p. m. over a very difficult title, apprehensive that he could not complete it, finished it, went to his office and worked

until 5 p. m., writing it up, ate supper, went to bed at 9:30 p. m. and slept, as he said, like a babe all night, awoke in the morning and reached his desk at 8 o'clock. The only inconvenience he felt was a slight muscular soreness; but remember that this was the first day's work at his desk for two years.

One curious phenomenon occurred after the fifth or sixth treatment. The patient had not perspired for a year in a normal way, and not at all for months, even after physical exertion, but just at this time, a warm day occurring, he worked in the garden and perspired freely, which surprised him very much. That night, after a bath, he "shed his skin," as he expressed it. The epidermis peeled off in such quantities and such large pieces that it blocked the opening in the bathtub as the water ran off.

It would be difficult indeed to attribute this result of static treatment to suggestion. It was not suggestion, for I promised him nothing, and he came because his wife insisted upon it. He is practically a perfectly restored man. There is nothing in the whole range of therapeutics, to my knowledge, but static electricity that would have accomplished it.

#### DISEASES IN WHICH STATIC TREATMENT WILL BE OF VALUE.

It is especially indicated in all chronic conditions of malnutrition and functional nervous diseases, in neurasthenia and neuralgia and nervous headaches are rapidly controlled by it. It is of the greatest value in chronic sonolitis, rheumatism, chorea, lumbago, sciatica, slow convalescence may be materially hastened.

An indiscriminate use of the different forms of treatment will result in failure. Each case must be studied and the treatment changed as the indications point.



REPORT OF A CASE OF ALVEOLAR MELANOTIC  
SARCOMA.

Reported by Edwin Walker, M. D., Ph. D., Evansville, Ind.

The case which I desire especially to report was so remarkable in its course and termination as to be for me an epoch in my professional life. No previous experience has produced so profound an impression. To see a rapid-growing sarcoma heal in a short time under any treatment is truly extraordinary. Such patients are doomed in spite of any known application of remedies. Here was a man grasped from certain death before my very eyes—can you wonder at the deep impression made?

The fortunate subject of this sketch was Jacob Saelwachter of Wadesville, Ind. He was 31 years of age and a farmer. He came to me Feb. 20, 1902. On the right cheek, just in front of the ear, was a black tumor protruding from the surface, one and a half inches in diameter. There were no enlargements of the glands in the neck. Under cocain anesthesia the growth was excised well out into healthy tissue. The wound was united with silkworm-gut sutures. It never healed.

Evidences of return could be seen in two weeks, small black spots appearing about its edges, and about this time an enlargement appeared under the angle of the jaw, which grew with great rapidity.

March 22, under general anesthesia, I made a second operation, excising the old wound widely. The incision was continued to the neck, and I removed the tumor, which had extended deep down between the vessels to the vertebra. The sterno-cleido-mastoid muscle was infiltrated for more than an inch. The diseased portion was thoroughly excised. At various points in the bottom of the wound black places could be seen. These were curetted, only to reveal the greater depth of the infiltration. The operation had lasted nearly an hour, when I concluded the complete removal was impossible. The wound was packed in gauze. There was no infection, still it was soon evident that the morbid process was again advancing. The wound showed no disposition to heal, and the surrounding tissues were rapidly infiltrated.

On May 1, as a last resort, it was decided to try the X-Ray. It was really a forlorn hope, for it seemed almost impossible to favorably affect a mass which was now hard and extended



to great depth. The gaping wound was two inches deep, covered with sluggish granulations, and the side infiltrated, involving almost the entire neck on that side.

Considering the gravity of the case, it was decided to push the treatment, even at the risk of causing some painful reaction, the danger of a burn having been fully explained to the patient.

The current was generated by a static electric machine. The tube was a "Gold Medal," No. 3572. It was high most of the time. At first the tube was placed at six inches from the patient, but later it was brought as near as three inches. The shoulder and face were protected by a lead mask. The first seance was ten minutes, but the time was increased to twenty, and later, thirty minutes. A few applications were made on alternate days, and after that were given daily. Occasionally the reaction was uncomfortably severe, and the treatment had to be suspended for a few days. At no time was there anything approaching a burn, nor was there any serious discomfort.

No black spots appeared after the first exposure, and after the third there was apparent improvement, and the skin had entirely cicatrized in two weeks. The infiltration gradually faded away. The last place to be affected was just behind the angle of the jaw. It occurred to me that the bone might be protecting it. The position was so changed as to allow the rays to come from behind, after which the place soon softened and disappeared.

By the last of July there was no evidence of the disease except the cicatrix. The applications were made once a week for another month and now we have him report once a month. The growth never occasioned severe pain, but there was a drawing, uncomfortable feeling. This disappeared as soon as the treatment was begun, but would always return if it were suspended for a few days.

There was another interesting feature worthy of mention. In adjusting the lead mask, he often steadied it with his hand, so that two fingers were exposed to the ray. They became very red and shed their nails. This shows that the nutrition of the tissues is profoundly affected by it. The

fingers, since guarded from exposure, are regaining their normal condition.

The tumor removed at the operation was hardened and examined by Dr. William R. Davidson, who made the diagnosis of alveolar melanotic sarcoma. A specimen was also sent to Dr. B. F. Cline of the Post-Graduate Medical School of New York, who confirmed the diagnosis.—*Journal A. M. M.*



### A CASE OF CARCINOMA.

Reported by May Cushman Rice, M. D., Chicago, Ill.

Mrs. E., aged 54. Referred by Dr. Cornelia deBey.

She had profuse hemorrhage in May, 1901, and in September was examined by Dr. deBey and referred to Dr. Shears with a view to surgery.

The latter found a carcinoma extending from the neck of the uterus into the walls of the bladder and rectum. He recommended curettement and cauterization, but otherwise pronounced the case inoperable.

After this slight operation, the last of October, she began X-ray treatment with Dr. Emil Grubbe. Exposures were made through the abdomen with a high vacuum tube excited by a coil. She gained in weight and felt better, but the discharge remained about the same. The middle of December she had severe hemorrhages. In January she began having more pain and hemorrhages every two or three weeks, and somewhat discouraged gave up treatment the last of March. At this time she was having fever, pain, night sweats and loss of strength

and flesh, accompanied by a good deal of sloughing off of tissue. No doubt the tax upon her strength in order to make the trip to and from Dr. Grubbe's office was largely responsible for the fact that there was no greater improvement.

On account of attacks of severe pain, lasting two or three hours, and a very profuse and offensive discharge, the patient was referred to me July 29 for X-ray treatment with only a slight hope that it might alleviate the symptoms.

Examination revealed a solid mass in the vagina with a much excavated cervix. None of the organs could be outlined. Even with a most careful examination there was considerable bleeding.

Exposures were made daily through a Ferguson glass speculum of small size, as there was only a slight amount of room for the introduction of the same. A tube of medium vacuum was excited by the static machine. A shield of lead foil protected all parts around the speculum. In spite of the small area exposed to the ray through the very small speculum, the pain was much relieved after the second treatment, and there was a steady decrease in the amount of discharge and odor. Treatments were given daily except Sunday until Aug. 22. From this time on the ray was applied on alternate days through the abdomen and speculum. As the patient had shown slight signs of dermatitis during the previous five months, and as there was such extensive invasion, it seemed best to remove the shields and give the ray as wide a range as possible. From Aug. 29 to Sept. 20 seventeen treatments were given without any shield. Following this a dermatitis developed over both the abdomen and buttocks, whereupon treatment was discontinued. At the end of a week the dermatitis had disappeared apparently and the patient was thinking of returning for treatment, when the dermatitis suddenly became more marked. There were large blisters over the abdomen and also on the buttocks. This was Sept. 29. The burns were not entirely healed until Oct. 28.

Oct. 31, five weeks after the last treatment had been given, a high temperature developed with profound general depression. Temperature remained 104 and 105 for several days. Severe chills followed. The offensive discharge, which had gradually disappeared since the beginning of treatment, re-

maintained almost absent up to this time. It now became very profuse.

Coincident with this discharge the temperature fell to normal and has continued nearly so up to the present time, Feb. 6. The patient has gradually regained her strength, until now she is able to be about the house. She has scarcely any discharge and no odor, and she has had no hemorrhage since the beginning of treatment six months ago. These conditions show that the malignant process has been checked. The result, so far beyond expectation, causes one to wonder what would have been accomplished had the treatment been continued, especially if the removal of the mass, thus lessening the liability to absorption of toxic substances, had preceded the treatment.—*From New Albany Medical Herald.*



#### ACCIDENTS DUE TO X-RADIANCE.

Current medical literature recounts a number of casualties which have recently occurred in the domain of X-ray therapeutics. The lesion resulting from this agency is peculiar in that sensation is not simultaneous with exposure, that indications of cell metamorphosis may be deferred several hours or even weeks, that recourse to stimulating treatment is unavailing and that the period elapsing between the date of exposure and the degree of reaction is devoid of ratio. The physiologic phenomena involved in the nutritive change is not yet satisfactorily explained.

The scope of these accidents is not confined to burns of the first, second or third degree, as ordinarily understood, but includes a fourth burn which is peculiar to skiagraphers and manifests itself in the form of minute papules on the hands after repeated brief exposures. The number of these elevations is limited in the beginning, but shortly the entire hand

assumes a crimson hue and becomes roughened, the normal markings suffering obliteration. Eventually the skin is markedly thickened, the condition being particularly emphasized in the knuckle folds, while the longitudinal striations of the finger nails are more conspicuous. This variety of burn has been experienced by Groover, who testifies to its extreme chronicity, skillful endeavor having failed to effect tissue resolution.

Alopecia in a child three years old, who had been treated for tinea tonsurans of the microsporon variety, is recorded in the practice of Whitfield. Two patches of the disease had existed for many months, one of which was subjected to fourteen exposures as an experimental measure. The ringworm disappeared, but the site of its occupancy sustained depilation of every healthy and diseased hair within a week after cessation of treatment. Before a month had elapsed, and while the other patch was being treated, return of hair was noticeable in the bald spot. The second patch had received ten exposures at this time, and although no loss of hair resulted, slight redness of the scalp indicated early shedding unless the seances were modified. The fact that instances of permanent baldness are reported forcibly illustrates the necessity of experience before electing this measure generally.

The premature demise of an English physician from malignant disease is alleged to be traceable to an X-ray accident. Blacker suffered a severe burn on one of his fingers while manipulating the apparatus. This irritation produced an unyielding dermatitis, which rapidly ascended the arm. Cancerous disease of the skin now appeared at the elbow, and evidences of malignancy were soon perceptible in the axilla, the disease finally involving the entire shoulder, the progressive character of which precluded operation.

Grubbe, who has treated several hundred patients for cancer and other malignant growths, recommends that the burning stage of the area exposed for treatment be retarded by the application of vaseline, and that surrounding tissue be protected from the caloric rays by a lead foil shield. This operator states that the vacuum of an ordinary X-ray tube is unreliable because of constant changing, and that only tubes whose vacuum allows of perfect control should be employed. The precaution of adjusting tube and shield before the current is turned on is

emphasized by Brown, who advises that when the fluoroscope is used the palm be directed toward the tube and the operator stand at a distance of several feet. A special glove lined with tin foil is worn by Beck.

George details some experience with radiotherapy in another department of this journal. Several cases are mentioned by this writer in which X-ray dermatitis was a factor, and reference is likewise made to a case in the practice of Rubel, wherein death occurred from the effects of an extensive burn of the abdomen. The appearance of a dermatitis is claimed by the author to be not only "an actual interference with the process of healing," but is also liable to render early death a certainty by extension of malignant growth and absorption of toxic products.

These few instances, even, should serve as admonitions to exercise the utmost caution when utilizing the X-ray machine as a therapeutic agent.—*The Physician and Surgeon.*



### A THERAPEUTIC SUGGESTION.

In the St. Louis Courier of Medicine H. N. Chapman, M. D., suggests that all cases of mammary cancer should be first submitted to the X-ray before operation, not for the purpose of destroying the cancer in the gland, but in order that any metastases in the axillary glands may be first broken down and destroyed. The cancerous mass in the breast should then be thoroughly removed with the knife, while the axillary glands may be preserved intact as a defensive barrier against the spread of the disease. After the wound is healed the X-ray treatment should be resumed for a considerable time.

He bases this suggestion on his observation of four cases in which the breast and axillary glands were removed with a fatal termination. He considers that the method of operation first followed by X-ray treatment has been proved an inadequate method.

# BOOK REVIEW.

*"The Practical Application of the Roentgen Rays in Therapeutics and Diagnosis," by William Allen Pusey, M. D., and Eugene William Caldwell, B. S. Published by W. B. Saunders and Company.*

Among the recent books treating of this most interesting department of the medical sciences this treatise is to our mind the most valuable from the standpoint of the experienced scientist. The subject is handled in a masterly way, both in the description of the apparatus and the principles involved, as well as in the therapeutic effects of the X-ray on normal and diseased tissue. Very complete details of the method of taking a radiograph of the different parts of the body are given, which will be of great value to the operator who has not obtained satisfactory results. Fully as much can be said concerning the explanation of the method of treating the different diseases in which the X-ray has been applied. Dr. Pusey has had a wide experience in the use of the agent. He has taken the pains to have many of his cases photographed, which show that many of the patients were in a desperate condition at the beginning of the treatment. Dr. Pusey's investigation concerning the effect of the X-ray on normal and abnormal tissues is of great scientific value. The book will certainly be a standard in this science.

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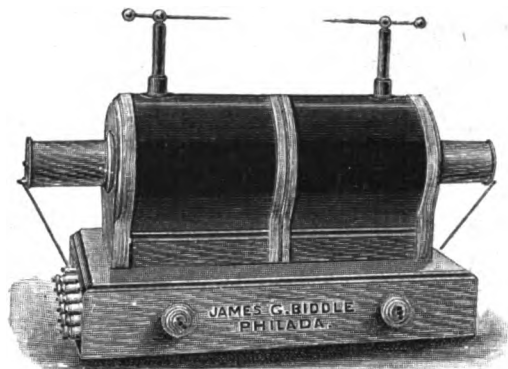
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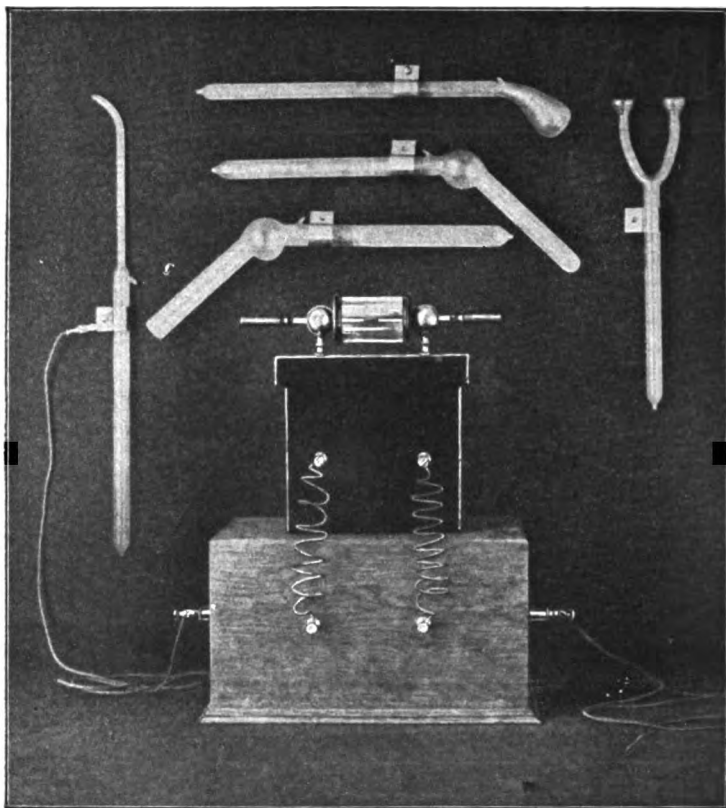
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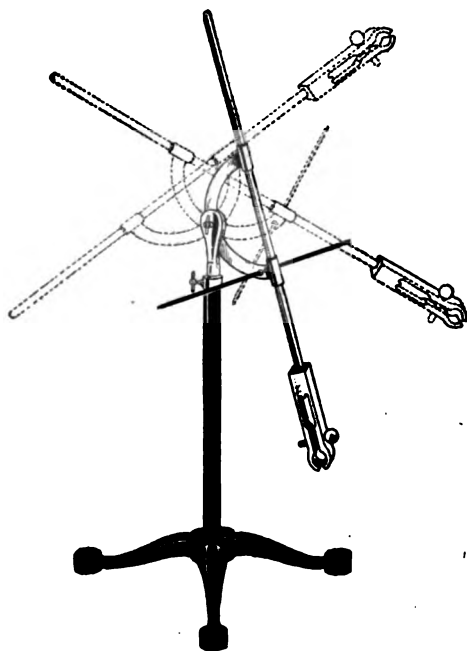
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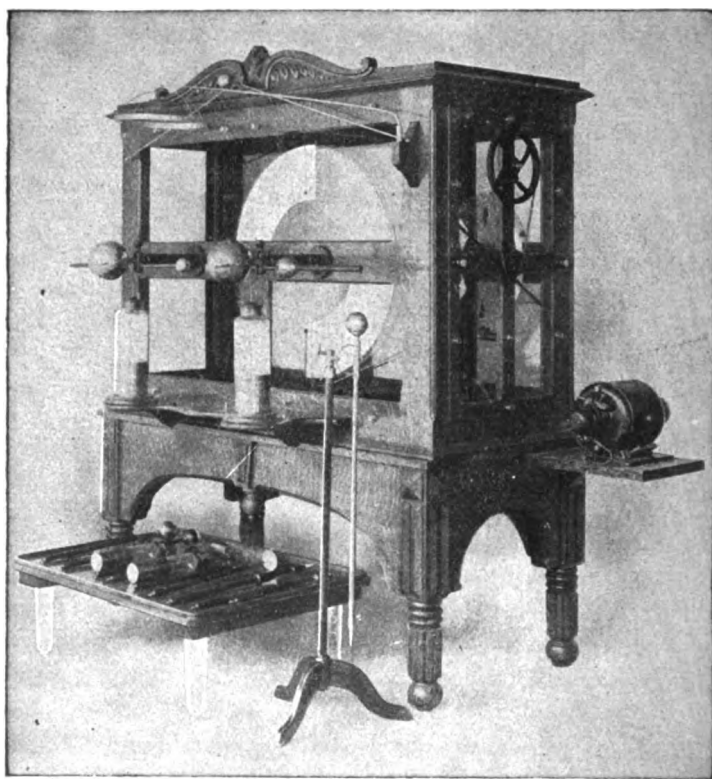
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*Professor of Electro-Therapeutics and Radiotherapy in the New York School of Physical Therapeutics, Editor The Journal of Advanced Therapeutics, and late Instructor in Electro-Therapeutics in the New York Post-Graduate School, etc.*

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# American Electro-Therapeutic and X-Ray Era

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## Original Contributions.

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### DUAL ACTION OF THE X-RAYS.

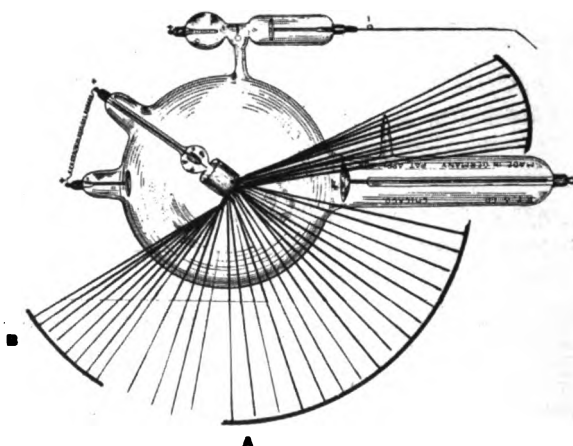
By W. H. Dieffenbach, M. D., Electro-Therapeutist to Metropolitan  
and Flower Hospitals, New York City.

I desire to report a clinical observation on the *dual action* of the X-rays as noted originally in a case of mammary cancer and subsequently corroborated in several other cases about the face. I refer to the difference in action on the skin of the rays given off at different angles from the nodal target. We know that the rays within the area labeled A (see sketch) have the most penetrating power and are the most active, producing, when projected upon the epidermis after a certain period, dermatitis and subsequent necrosis, if the exposure is continued sufficiently long. The rays contained in the respective areas B (see sketch) are less marked in action, and while we are producing dermatitis with the central or A rays in a given time, the outer or B rays appear to produce merely a local stimulating effect.

Thus in the case above referred to we treated a recurrent scirrhus of the breast with the focus of the target directed so that the rays in the area A would affect the lesion in the mammary region and also some of the axillary space. The patient objected to the usual tin-foil protection, and after a period of time we noted that the exposed side of the cheek and face barely within reach of the B rays exhibited a luxuriant growth of beard. The opposite side of the face not within the



sphere of the direct ray was not affected, so that attention was quickly called to the peculiar condition of hirsute adornment on one cheek and none on the other. In a second case of recurrent tumor of the breast the same phenomena was noted, although a thin tin-foil protection had been employed. Both cases were females. The conclusions to be drawn from these observations would tend to show that the B rays (see sketch), given for the same time as the A rays are stimulating to the skin and its appendages, while the A rays, as is well known, are destructive. We have noted this difference particularly in medium and low tubes.



The therapeutic deductions from these observations would be to employ the B rays where cell stimulation was desirable (thus, after operative procedures, etc.), the A rays only when dermatitis or necrosis was the object striven for. These observations would also reconcile the apparent contradictory reports in European and American journals of cures of alopecia and hypertrichosis by the X-ray. The rational treatment for these respective conditions would be to subject the cases of alopecia to the B end of the ray, low or medium vacuum, the cases of hypertrichosis to the A or destructive rays.

These facts and deductions may have been printed before; if so, they have escaped my notice. We know, of course, that

the high, low and medium vacuum tubes have distinct differences of action, but the fact that the central or A rays and the outer or B rays have actions practically and vitally distinct is worthy of further study. I would be glad if the readers of the *Era* will confirm or criticise above contentions.



#### THE USE OF THE HIGH-FREQUENCY CURRENT IN THE TREATMENT OF ACUTE AND CHRONIC ECZEMA.

A Resume of the Subject Presented to the French Association for the Advancement of Sciences, Aug. 14, 1903, by Dr. Gaston Block (Paris). Translated from the French by Albert Bingel, Assistant at the Cincinnati Post-Graduate School of Physiological Therapeutics.

(Translator's Note.—In order to get a good view of the subject as seen by Dr. Bloch, Apostoli's former associate and collaborator, it is well to remember the technical resources which modern electro-therapy places at our disposal in the use of high-voltage and high-frequency currents. The high-frequency coil of d'Arsonval is probably the best known of these technical adjuncts. A more powerful device is the resonator of Oudin, which is comparatively but little known in this country. Both the coil and the resonator are at their best if operated in conjunction with a powerful induction coil or X-ray coil. Since most of the electro-therapeutic work in this country is done with the aid of the static machine, the "diasolenic" (modification of the solenoid for static currents) is probably the most

serviceable device for the production of the high potential (both zone and direct current) for the treatment of skin diseases.)

Electro-therapeutic methods during the past few years have assumed an important place in the treatment of chronic diseases. The so-called physical therapeutic agents are in many ways superseding the pharmacological products of old.

This change in our therapeutic reasoning has affected the treatment of many chronic ailments, especially those of the skin. We all are familiar with the obstinate character of these affections. They usually resist all the old methods. To exemplify the progress made by the aid of electro-therapy in the treatment of skin diseases I beg to present the subject of eczema from a clinical and electro-therapeutic standpoint.

One of the first accounts of the action of static electricity in the treatment of cutaneous diseases was given by Doumet and Leloir in 1893. They noted the good effects which followed the application of static currents in skin troubles characterized by severe itching. They observed the palliate action in relieving the pruritus and in mitigating the condition of the affected area, especially in chronic cases of eczema.

The introduction of the high-frequency resonator of Oudin was a step in the direction of progress. Oudin reported many cases of obstinate eczema which had been treated and cured by his device. Oudin's results were verified by many eminent observers.

I shall refrain from any detailed description of apparatus, taking it for granted that most of you are familiar with the salient points of the technical auxiliaries. I shall confine myself to the electro-therapeutic technique of these applications.

There are three principal ways of applying the high-frequency current, to-wit:

1. By means of a glass-electrode, which is brought in direct contact with and rubbed over the skin.
2. By means of a brush-discharge from a suitable electrode.
3. By means of direct sparks from the electrode surface.

These different methods of application may be used in turn on the same patient. There is everything in individualization. The technical indications differ with each case.

Oudin is very precise in stating the various conditions which might affect the technical indications of these applications. He describes accurately the electrodes he uses—e. g., the glass electrode and the fine metal brush. When there is no inflammatory reaction, no redness, no acute process, he employs the fine metal brush. This is his technique in chronic eczema, psoriasis, etc. Where there is much irritation and inflammatory reaction (acute eczema), or if the seat of the trouble is a mucous membrane, he uses the glass electrode. Sometimes there are indications which make the use of the glass electrode undesirable. If the skin is cracked the minute sparks from the glass electrode are apt to irritate the fissures and cause violent stinging pain. In these cases the brush is preferable, since it does not irritate by sparking. A good deal depends upon the technical dexterity of the operator in applying and removing the electrode.

The relative frequency and the duration of the treatments are important questions which have much to do with the ultimate outcome of the treatment. At first I began to make daily and prolonged applications in order to get quick results. I soon found that it does not produce good results to push the treatment. I soon realized that Oudin's rule to make an application every other day and not to prolong it over 5 or 10 minutes was a safe rule to follow. How soon can we expect results? This depends altogether upon the case. Sometimes we can accomplish a complete result after two or three sittings. At other times ten, fifteen or twenty treatments are necessary.

It is a peculiar fact that in some cases the benefit seems to cease after a certain number of treatments. The case seems to become stationary, as it were, after a period of rapid and marked improvement. When this state of affairs becomes manifest, suspension of the treatment for two or three weeks is indicated. After two or three weeks the treatment can be resumed and continued with increasing benefit until the cure is complete. An occasional interruption of the treatment seems to have a salutary effect. The subsequent treatments become more effective. There are no fixed rules by which the frequency and the duration of the treatments can be determined. We must remember that in many instances we are not treating

an eczema, but a diathesis, a disposition toward eczema, or, if I may express myself in this way, an eczematous organism. It is all a question of individualizing. Some patients require delicate and discreet handling, while others can stand heroic treatment. If we do not wish to fail we must take into consideration the condition of the patient, the history of the affliction, etc. The character of the apparatus to be used is of some importance.

Bollaen de la Haye narrates the following incident: "I was using the Oudin instrument with the glass electrode on my first cases and got very poor results indeed. The first seven cases I treated showed no improvement. Some of them seemed to get worse. I attributed this state of affairs to my own lack of experience and dexterity. At times I was tempted to doubt the efficiency of the apparatus. I had the apparatus looked after. It was found to be very much at fault. It could not produce the proper kind of a high-frequency current. After the apparatus had been gone over carefully and existing faults corrected I began the treatment of my seven cases over again, and was delighted with the improvements which followed in all of them." The first sign of improvement is, as a rule, the disappearance of pruritus. We are all familiar with this most distressing symptom of chronic eczema and with the difficulty which is encountered in trying to relieve it by drugs and local applications. The high-frequency current relieves the itching in 95 per cent of cases. All authors agree on this point. After the pruritus ceases the crust gradually loosens and drops off. Normal conditions are soon established. In the moist and fissured varieties of eczema the skin becomes dry and the fissures heal up. Sometimes a sudden recurrence takes place. One or two additional treatments usually make the cure complete and permanent. At times the patient is best treated in short sittings once every other day. It is important to remember the harm which is often done by too much treatment.

I beg to submit to you the reports of eleven cases which I have treated. The result in these cases was invariably good. In one case the result was incomplete because the patient stopped the treatment when he was relieved of the itching.

*Fissured Eczema of the Fingers.*—M. M., age 40, case being

one of seven years' standing. Fingers show many deep, painful and angry-looking fissures. Ten applications, one every day, were not followed by any noticeable improvement. I used the Oudin instrument with the glass electrode. After ten applications of the high-frequency current I substituted the static breeze, the result being prompt improvement after three applications.

*Chronic Eczema of the Wrist.*—Mrs. D., cook, 35, suffered from intolerable itching. Static applications relieved the pruritus, but had no effect on the eczematous condition. Fifteen applications of the high-frequency current resulted in a cure.

*Eczema of Hand.*—Mr. D., chemist, 38, sustained a phosphorus burn, which led to the development of a large eczematous patch on the right hand, involving the thenar eminence, palm of hand and the phalangeal articulations of the little and middle fingers. The eczema was angry-looking and fissured. Static applications were of no avail. The high-frequency current relieved the itching and caused the fissures to granulate and close. In spite of the fact that the patient did not take treatment regularly, the result was a complete cure.

*Eczema of Right Elbow.*—Mrs. G., housekeeper, suffered from an eczematous patch of the right elbow. Pruritus was very severe. Itching was promptly relieved. Patient was well after ten applications of the high-frequency current.

*Multiple Eczema.*—Miss B., age 21, had eczematous patches on the forehead, upper lip and thumb of right hand for twenty years. Patient was cured in ten sittings.

*Moist Eczema of the Hands.*—Mrs. A., 40, had eczema since childhood. Discharge ceased after the first high-frequency treatment. The patient, while still under treatment, is fast getting well.

*Eczema Around the Anal Orifice.*—Mrs. H. had suffered for many years. After the third treatment the discharge ceased, after the sixth the fissures began to heal. Ten treatments resulted in a complete cure.

*Four Common Cases of Eczema* of different parts of the body were cured by the high-frequency current in from three to ten treatments.

In giving a clinical analysis of these cases it behooves me to state that the good results following the use of the high-frequency current are due in an almost equal measure to the general tonic effect of the current on the whole system and to the local action of the current. Oudin, d'Arsonval and Leduc have called attention to the powerful action of the high-frequency current on the physiological processes of nutrition, respiration, metabolism, excretion of urine and the circulation. The correctness of these observations has been clinically demonstrated by Apostoli and Berlioz. Moutier and Doumer have verified the statements made in reference to the effect of the high-frequency zone (intra-solenoid or diasolenic zone) on the vaso-motors, on the quantity of oxyhemoglobin in the blood, etc. There is no doubt as to the intense effect which high-frequency currents will produce on every phase of nutrition.

Locally these currents affect the functional activity of the nerves of the skin. That these currents possess a decided germicidal power there is no doubt. Oudin states most emphatically that the high-frequency currents influence the body temperature, combustion, arterial pressure and the function of the sweat glands. These currents affect the blood supply of the skin, the erectile functions of the cutaneous papillae and the nutrition of the excretory glands of the skin. The anti-bacterial action of the high-frequency current has been studied by many observers. Some attribute the effect to the increase of the local metabolism which follows the application of a high-frequency current, others believe in the existence of an antitoxic element in the current itself. The following statement made by Oudin and Doumer probably represents the *status quo* of this question, as far as the opinion of the best operators is concerned: "There is no doubt that the high-frequency current plays a most important anti-microbe role. We believe that their anti-bacterial action is due to the manner in which they affect the local circulation and secondarily the nutrition of the cellular elements of the parts. By actively draining the capillaries they stimulate phagocytosis, increase the general resisting power of the organism."

The germicidal action of the current does not seem to mani-

fest itself to such a marked degree if the application is made by means of the so-called "electric zone" (diasolenic zone, intra-solenoid zone). In order to produce the characteristic effects of the high-frequency current locally in cases of cutaneous diseases the application should be made by means of a suitable electrode. For my part I believe that the best and most permanent effects can be produced by a combination of both methods, to-wit: The use of the "electric zone" in order to affect the metabolic process locally and generally, and the employment of a suitable electrode for the purpose of direct local application. The treatments are to be from ten to fifteen minutes every day or two. In all cases the operator must know how to individualize in keeping with the existing condition and with his knowledge of the therapeutic indications.

It is but fair to state that the pioneer work along the lines of high-frequency currents was done by the late M. Apóstoli, whose assistant and associate I have had the honor of being. It was he who first called attention to the remarkable palliative and curative power of the high-frequency current.

(Translator's Note.—The electric zone of which the author speaks is that electrically surcharged areola which surrounds the source and the conductors of high-voltage currents. A glass electrode which is held in this zone lights up without any wire or cord. It is this "zone" which gives the solenoids their peculiar therapeutic power. The diasolenic attachment to the static machine which has been used very extensively in the laboratories of the Cincinnati Post-Graduate School of Physiological Therapeutics combines the electrodal and zonal effects of high frequency.)





## RADIOPHOBIA AND RADIOMANIA.

(Read at meeting of Southern California Electro-Medical Society, June 2nd, 1903.)

At the present time the attitude of the medical profession toward X-ray therapy is decidedly multiplex; from the most ardent X-ray enthusiast who believes he can cure all ills of mankind down to the ultra-conservative, who has not yet accepted vaccination nor antitoxin, and who is antagonistic to all forms of modern therapy.

Under the head of "radiomania" we can classify those who run to extremes with the X-ray and make therapeutic use of this agent upon the slightest provocation. This is the most dangerous type of practitioner to meet with, both for the conservative radiologist and for the cause of scientific radiotherapy. Very often this man's knowledge of the X-ray is extremely limited, being based upon the brief possession of an X-ray generator, together with some literature, which is still too new for him to make safe following. His premature results and sometimes published reports have given our cause a black eye and greatly discredited more honest efforts. Happily the radiomaniac is becoming scarce and will no doubt be obsolete in due time. This is owing to the fact that the X-rays are now being placed upon a definite therapeutic basis, and their limitations established with comparative accuracy.

By "radiophobia" we mean, of course, an undue fear of the X-ray. To this class belong those who are afraid to make use of the rays or else do not use them sufficiently strong, fearing burns or other untoward results. This is largely due to the newspaper reports in which are chronicled startling accounts of alleged X-ray burns and an occasional damage suit. A wholesome fear of the X-rays is a good thing, both for the physician who uses them and for the patient, but to treat a case in a half-hearted way, using an insufficient amount of these rays is almost as bad as overdosing. From published reports of cases treated it is evident that not a few suffer from radiophobia when it is stated that twenty or thirty treatments were given in such and such a case, without producing any effect on the skin or condition present. Some of these cases could

undoubtedly have been influenced if proper dosage had been applied.

A retrospective view of the literature which covers the field of X-ray science will convince the careful student that very little has been added to our knowledge of the physical properties of this force since Roentgen's original classic paper was published to the world. It is true that we have improved markedly in our technique of application and have learned to equalize the forces at work in our generating apparatus, to the production of the best X-radiance. We have, as yet, however, only fairly entered upon the proper study and application of this potent factor. Notwithstanding these facts, however, probably no single agent to-day is applied therapeutically for a greater diversity of disease than the Roentgen rays.

Has this new therapeutic entity come up to our expectations and fulfilled the predictions made for it? I maintain that it has already done so in a great many directions, and that it gives promise of becoming the greatest factor in modern medicine and surgery.

From my own experience with the X-ray I can state in general terms that almost any eruptive lesion or neoplasm on the skin is amenable to this treatment. The acute exanthematous conditions, of course, being excepted. Epithelioma, rodent ulcer, lupus, circumscribed eczema and acneiform eruptions usually yield readily. In deep-seated tumors or involvement it is a little early to make any definite statement. Symptomatic relief is often obtained, but it is doubtful if many cases treated have so far resulted in permanent cures.

In regard to burns—When treating over sound skin it is often desirable to produce a mild dermatitis or tanning, so called, for this lowers the resistance of the skin and enables us to apply more current. Under no circumstances, however, is it necessary to produce a destruction of the skin which results in an ugly sloughing wound that may take months and months to heal. I have under my care at present a lady whose entire abdomen was denuded while being X-rayed in a local quack electrical institute for a vague internal trouble. A case of this kind, which always becomes widely chronicled, will

give X-ray therapy a greater set-back than a dozen meritorious cures can overcome.

We all know that the public has become very much interested in the X-ray and are desirous of testing its curative powers. No one has been quicker to recognize this than the unprincipled charlatan who has equipped himself with the necessary apparatus and flaringly advertises the sure cure of every disease extant. The only way for the legitimate physician to successfully cope with these quacks is to prepare himself by careful study and to install the required apparatus for this work.

The future of radiotherapy is assured and it only remains for this society which has been so successfully inaugurated to begin the good work.

I sincerely trust that it may be the privilege of this society to establish radiotherapy upon a firm ethical basis in southern California and accord it the prominent place in therapeutics it demands.

ALBERT SOILAND, M. D.,

*Instructor in Electrotherapeutics and Radiology, College of Medicine, University of Southern California; Lecturer on Medical Electricity California Hospital Training School for Nurses; Radiographer to the Southern Pacific and Santa Fe Rys., Los Angeles, Cal.*



#### A SUGGESTION FOR RADIOGRAPHING THE FOOT AND LEG OR THE FLEXED ARM IN AN ANTERO-POSTERIOR DIRECTION.

Professor Sinclair Tousey in the issue of August 29 of the combined New York Medical Journal and Philadelphia Medical Journal has an article, "An Improvement in Radiography." He says that a print may be made by direct exposure and developed in half a minute without a dark room. In his method the usual photographic plate is replaced by sensitized paper.

The fact that X-rays act upon sensitized paper has been known almost since Roentgen's discovery. But every X-ray expert knows why the usual method of radiographing is far superior in the vast majority of cases. He knows that the time saved in the development of the paper does not at all counterbalance the manifold disadvantages of a prolonged exposure required in the use of sensitized paper. To this must also be added the greater detail obtained in the use of the plate.

There is one condition, however, when the plate might better be replaced by a sensitized film which requires no longer exposure than a plate—namely, in radiographing the flexed arm and leg or the foot above and below the ankle joint. (See sketches.)

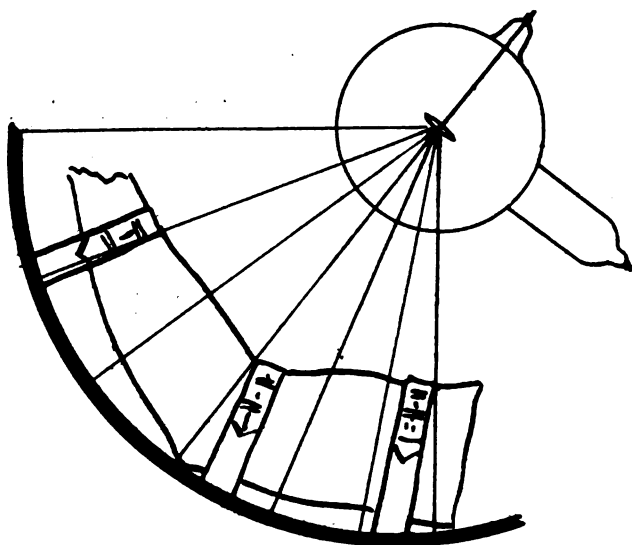


FIG. 1.

As far as I know, Prof. Hoffa and Dr. Wolfenstein in Berlin were the first to employ this method, and if I remember well it was at a meeting of the "Berliner Verein für Innere Medizin" in the month of March of this year, that he first demonstrated his results. He employed the method especially in photographing the ankle joint. A piece of film or sensitized paper inclosed in a black envelop was closely attached to the

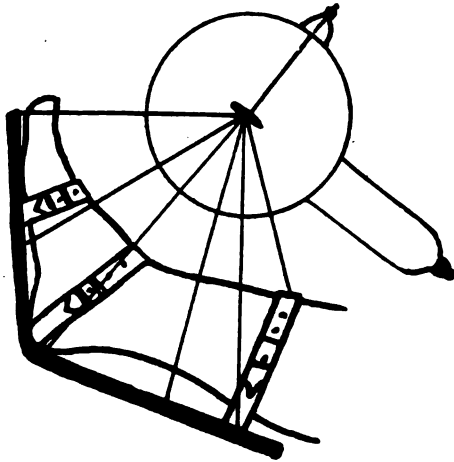


FIG. 2.

foot and then the photograph taken. Even here, however, there was some distortion produced, as the projection of the different bones was not equal, because the angle of the rays was different for different parts of the film.

In order to overcome this disadvantage I suggest the arrangement shown in Fig. 2. A half cylinder of lead, to which is attached by clamps the enveloped film, so that it closely touches the metal, is put in a symmetrical position to the foot or bent extremity, and then the focus of the anode is put in the axis of the cylinder. It is evident that by this arrangement the least distortion is obtained; first, as all the rays strike the film at right angles, all parts of which are at an equal distance from the focus, and second, because the shadows cast by the bones suffer the minimum of distortion.

K. G. FRANK, PH. D.

#### FOR WHAT CONDITIONS AND HOW SHOULD X-RAYS BE USED.

Abstract from a paper in the Cincinnati Lancet-Clinic by Edw. H. Shields, Cincinnati, Ohio.

The author states that the X-ray is no cure-all and that it is of value only in superficial lesions. He says that rapidly growing epitheliomata are more quickly influenced by the ray

than those of slow growth because the former are more cellular and the cells yield quickly to the treatment. He now protects his patients with a paper mask shellacked upon the inner surface and covered with four layers of tinfoil applied externally. This mask is light and conforms to the shape of the face. The patient is protected from electro-static shocks. A metal helmet is used to protect the hair. A window is cut in the mask large enough to permit the treatment of any lesion on the face. The convex surface of the tube is placed about three inches from the part to be treated. He considers it absolutely necessary to produce a superficial necrosis and therefore applies the rays daily for ten minutes until the symptoms of a reaction appear. It is then time to be careful in order not to produce a too severe dermatitis.

The author treated five cases of lupus vulgaris with good result. He exposes not oftener than two or three times per week aiming to give only very mild treatments since the diseased area is very cellular and breaks down easily. He does not favor the use of the X-ray in the treatment of psoriasis, acne or eczema, claiming that the more usual remedies are more efficacious. He found that the treatment **was not effective** in the permanent removal of superfluous hair and regards it as attended with some danger of pigmentation. The hair is sure to return in six months.

#### REPORTS OF CASES.

"Thirty-one cases of epithelioma were treated with the X-ray, and the result in every case with one exception has been perfect, but we are satisfied that after further treatment this case will also result in a cure.

"In all of our cases the ray was applied daily from eight to fifteen days; invariably a reaction set in between this time, and from then on the ray had to be applied less frequently in order to keep the reaction within bounds.

"During the course of treatment of the various cases it was noticed that the base of the ulcers, which were indurated, uneven and covered with pale granulations, became smoother, softer and redder in appearance; that the edges, which were elevated and indurated, first became undermined, and later, when they became softer, fell in, making the ulcer smaller.

This process of so called 'cleaning up' continued until all of the epitheliomatous structure had sloughed out, leaving a clean, soft, ulcerating wound, which now possessed none of its original characteristics, and from then on filled up rapidly and cicatrized, leaving a soft, smooth and movable scar, which in many instances resembled normal skin. The one unfavorable case had been treated with pastes, and, there being a recurrence, she was referred to us for treatment. The epithelioma made its appearance in the scar tissue, and was therefore very hard. In cases of this kind the ray acts very slowly in dissolving the tissues; the atypical structures apparently come away, leaving the tough scar tissue, and the lesion has the appearance of being well, while in reality much of the typical epithelial structure is imbedded in the scar tissue, and if the treatment is stopped too soon you can surely expect a recurrence; such was our experience.

"In all of these cases we have found that after the ray once begins to act a steady headway is made, and up to the present time we have had no unfavorable or disastrous results.

"Our experience in lesions located upon the lip has been limited to two cases, and in both the number of exposures required to produce a reaction and subsequently a result have had to be more numerous than for lesions located elsewhere, irrespective of size.

"In all epitheliomas involving the free margin of the lip we have infiltration of the entire thickness, so you can readily understand why more treatments are necessary.

"In lesions situated elsewhere the infiltration is seldom more than one-eighth of an inch in depth.

"The treatment of malignant growths of the internal organs by the X-ray is a complete failure, because we cannot burn them. The deep lesions treated by us were four cases of carcinoma of the larynx, one of the jaw, five of the breast, one of the stomach, and three of the rectum.

"In the first four cases no results were obtained, with the exception of relief from pain to a greater or less degree. Of the breast cases treated, three were rayed under the most favorable conditions, namely, after a thorough operation; one of these cases, operated upon in May, took treatment imme-

diately after the wound healed. In July the patient had some vague symptoms which pointed to the development of a new growth, and after waiting for four weeks all of the symptoms pointing to a tumor involving the mediastinum developed, and it was then possible to make a positive diagnosis. It is to be noted in this case, that in spite of the fact that this patient was rayed over the area in which the new growth made its appearance, a secondary growth developed. Case two of this class had her first operation performed nearly two years ago; six months later she had a recurrence and was operated, and again she had a recurrence twelve months after the original operation. The skin covering the ribs was a mass of cicatricial tissue and the movement of the arm was greatly impaired; this patient received daily treatments until a reaction was established, then discontinued and only renewed when all symptoms had disappeared. After four months' use of the ray the rough and elevated cicatrices became smooth, pliable and flat, and the impaired motion was restored. This patient received treatment for six months; ten months have now elapsed since the first treatment, and there has been no recurrence or metastasis. Time alone can tell what the outcome will be, and if there is no recurrence it will not signify that its absence is due to the ray. Case three has, up to date, undergone five operations. This patient received daily treatments for thirty days, and as to the result I can only say that the patient feels well and that during the course of treatment a small nodule developed.

"Cases four and five died. The rectal cases were all inoperable; of these, one passed out of our hands without improvement; another died eight months after the beginning of his treatment. The third case of this class had a malignant growth six inches above the anal orifice.

"Eighty treatments were given through an inch and a quarter speculum passed up to the diseased mass. The treatment was given six times a week, until the patient received forty exposures, each of ten minutes' duration, and, strange to say, after such forced treatment but little reaction manifested itself. If there ever was a favorable case upon which to test the ray this one seemed so, but it turned out otherwise.



"Eighteen cases of sciatica were treated; they were all of the idiopathic form; in all of these cases we were able to relieve the pain for from one to twenty-four hours; after each application the pain, when it returned, was not so severe as in the beginning, and the free interval was gradually increased. Out of these cases we have had five in which a cure was positively effected. Five to eight months have now elapsed and there has been no recurrence. The method of treatment consists in allowing the current from the machine to come to within six to eight inches of the body, the duration of each treatment being from one to five minutes.

"Five cases of lumbago gave positive results in three, absolute negative results in one, and a slight improvement in another, which is equal to a failure. These cases required three exposures each to effect a cure.

"Many cases of rheumatism were treated with more or less success, and the results were very gratifying, inasmuch as the patients were relieved of their severe pain.

"The cases of facial neuralgia treated showed some beautiful electrical effects. There is no question as to being able to cause the pain to subside, but there is some question as to how long the patient will be free from pain. Relief was obtained in these cases in from one to twenty-four hours.

"Another case of great interest was that of a young man who had sprained his ankle a week before we saw him. He limped into the office and was complaining of severe pain. He was treated with the high frequency current for three minutes before he felt any evidence of relief, and at the expiration of five minutes he said that he felt as well as ever, and then walked to the elevator with a perfectly normal gait. In this case there was no recurrence of pain.

"The high frequency current can be successfully used for many painful affections, and, as its application is perfectly harmless, it may be used as often as one may see fit without injury to the patient."

Comments.—The author was hardly using the high frequency current, if he placed his patient within six to eight inches from the terminals of the machine, even though he was using a Tesla coil. In any case he was using the electro-static

spray. We are surprised that his cases of sciatica progressed so well. We shall watch for a further report before thinking the results will be permanent. We hope soon to have an article on the high frequency current and its use in electro-therapeutics.



### THE IMPORTANCE OF THE X-RAYS RECOGNIZED BY A JOURNAL OF SURGERY.

The October issue of the International Journal of Surgery is given up entirely to electro-therapeutics. Among the contributors are Morton, Gottheil, Cook, Brickner and Rockwell of New York, Edwards of Nashville, Campbell of Brooklyn, Varney of Detroit, Center of Quincy and Dunn of Louisville. The reports show what is being done with the X-ray, both as diagnostic and therapeutic agents. The articles show the large field in which the X-ray and actinic light have been applied in skin lesions and will do much to make the use of the X-ray more popular. We are not sure, however, that this would be a desirable thing, for there is always a danger of the agent being used in a purely empirical manner. Just now the warning is needed that serious and incurable lesions should not be treated by inexperienced operators. Many of the articles emphasize this point, as shown in Campbell's article by the following quotation: "*The technique of X-ray therapy is not a science, it is an art; it is not to be learned from books, it is the product of experience; it evolves as experience ripens, and each case demands an adjustment of the means to its particular needs.*"



## Editorial.

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DR. ROBERT NEWMAN.

All electro-therapeutists will keenly regret the death of Dr. Newman, which occurred last month. Although he was a man advanced in years, his ambition and natural vigor kept him at work up to within a very few days of his death. His article which we reprinted in our last issue shows his wide connection with different medical societies and hospitals in New York city. He was an associate editor of the *Journal of Advanced Therapeutics* and was much beloved by all his associates on that journal.

Dr. Newman has undoubtedly done more than any other physician to advocate the use of galvanism, particularly in the treatment of urethral strictures. His article shows his confidence in the treatment. The method seems to have been discarded by genito-urinary specialists. We hope to promote a discussion of this method and have all the facts clearly stated both for and against this method. Dr. Newman described his technique years ago and many careful operators must have come to some definite decision concerning its value.

### NOTICE.

The next regular meeting of the Chicago Electro-Medical Society will be held on Tuesday, Oct. 27, at room 301, Schiller building, at 8:15 p. m. Dr. Noble M. Eberhart will read a paper on "The X-Ray as a Beautifier." W. C. Fuchs will give a discussion on "Some Color Effects Produced by the X-Ray."

### POSTPONED MEETING.

The September meeting of the Chicago Electro-Medical Society fell upon Tuesday, Sept. 29, the evening of Chicago day. As the streets were blocked, but few members were present, although both the speakers of the evening, Dr. Noble M. Eberhart and W. C. Fuchs, were present. It was decided to postpone the reading of the papers until the next meeting in order that the members might participate in the discussion.

C. H. TREADWELL, Secretary.



### THE USE OF ROENTGEN RAYS IN THE TREATMENT OF PULMONARY DISEASE.

In one of the August issues of the *Lancet* a paper bearing the above title appeared as a leading article. The work of some of the American writers was reviewed, among them being Dr. Williams of Boston. The article explained the value of the fluoroscopic examination and also stated that the radiograph was a permanent record of the condition of the denser structures of the chest, remarking that only an instantaneous picture would show the true state of any movable organ.

One of the English operators, Dr. Halls Dally, suggested a change in the nomenclature of the different kinds of shadow thrown on the fluoroscopic screen. He suggested that we use the terms "trans-radiancy" in place of translucence, which would correspond to the normal resonance of percussion; "brighter" corresponding to hyper-resonance; "faint shadow" corresponding to impaired resonance; "dense shadow" corresponding to dullness; "opacity" corresponding to absolute dullness. Besides the shadows of the ribs, clavicle, scapula and the shadows of the heart and mediastinum, on the fluoroscopic screen there are some faint, ill-defined streaks which he calls "pleuro-pericardial lines," since he considers that these are produced by the junction of the parietal pleura with the mediastinum. Dr. Lawson, on the contrary, thinks that these shadows are due to the puckering of the outer edge of the pericardium during systole.

After the examination of a large number of normal cases Dr. Halls Dally has concluded that the diaphragm movements in quiet respiration are half an inch on each side, but in maximum respiration the movement is  $2\frac{7}{8}$  inches on the right side and  $2\frac{5}{8}$  inches on the left side, apparently without the flattening movement usually described in books, but with a bodily movement downward called by Dr. Walsham "the piston movement."

Dr. Halls Dally has concluded that any lesion in the lung tissue will first affect the motion of the diaphragm. Consolidation can only take place after a considerable involvement of lung tissue, and such a condition will be revealed by percussion as well as by the shadow in the radiograph.

Comments.—The limitation of the movements of the diaphragm was noted some two years ago by J. Edward Stubbart of New York, who gave detailed description of the early signs of tuberculosis that could be detected by fluoroscopic examination. It is interesting to see that his work is being corroborated by other investigators.



### LIGHT WAVES, VISIBLE AND INVISIBLE.\*

(By Frederick Hoyer Millener, M. D., Buffalo, N. Y.)

The therapeutic potency of light waves, visible and invisible (the X-rays and the ultraviolet light), has of late been vaunted with so much sensational exaggeration in some of the more unscrupulous daily newspapers that there is some danger of this promising method becoming enveloped in a miasmatic vapor of quackery that may seriously interfere with the development of its practical usefulness and the mischief thus wrought is

\* Reprinted from the Buffalo Medical Journal, Sept., 1903.

twofold: false hopes of cure are excited in the minds of sufferers and their friends; and the treatment itself comes to be regarded by medical practitioners as pitch that defiles those who touch it. In this way an element having in it large possibilities of good, may be unjustly discredited in the eyes of both the profession and the public. Hence, it is at the present time especially important that the results obtained by means of the X-rays, by practitioners whose work is open to the inspection of their professional brethren, should be fully and accurately recorded with the purpose of showing both what has been attempted and what has been accomplished. Observers of equal honesty receive different impressions from the same phenomena, and even their records of facts take the color of their mental temperament. Inexperience is generally prone to an unfounded optimism; on the other hand, impatience and want of attention to detail, lead to an equally unfounded pessimism. One of the obstacles to the progress of medicine is what may be called the summary mode of dealing with methods on their trial. A method should not be condemned when applied improperly if it fails in unsuitable cases.

For a thorough understanding of the X-rays, the ultraviolet light, and other light waves used in medicine, a consideration of the spectrum is necessary. When a beam of sunlight is allowed to pass through a small aperture into a dark room and fall upon a prism, the ray of light passing through the triangular piece of glass is decomposed and, on its emergence upon the other side, is separated into the seven prismatic colors. If the axis of the prism is vertical and the decomposed ray is directed upon a white screen, it will appear as a long narrow ribbon composed of the seven primary colors in which the red will be to the left, followed in order by orange, yellow, green, blue, indigo and violet. If the temperature of these colors be tested by that extremely delicate thermometer, the "thermoelectric pile," it will be found that there is no appreciable heat in the violet, nor in any of the colors until the red is reached, and that tested by the thermometer, the heat increases in the dark space beyond the red ray, which space is known as the infra-red, calorific or thermal space. If, on the contrary, a photographic plate is exposed to the action of the prismatic ray, it will be

found that the red, orange and yellow rays have no appreciable effect upon the sensitive coating on the plate, and that it does not commence to darken until it is exposed to the blue light; and further, that the shade gradually increases through the indigo and violet rays, reaching its maximum in the dark space beyond the violet, which space is known as the actinic or ultraviolet space. These waves are of such short length that of course they cannot be seen. It is in this actinic space beyond the ultraviolet that the wonderful influence known as the cathode and x, or Roentgen rays are found.

The accepted theory of the nature of the forces known as sound, light and heat is the "undulatory." According to the theory, the entire universe is pervaded by an extremely attenuated mobile gas, known as luminiferous ether, which is imperceptible except when thrown into vibration. A vibration of many hundreds of thousands of waves a second which affects our hearing apparatus we recognize as sound; a vibration of many millions of waves a second which affects the nerves of feeling we recognize as heat; a still higher rate of vibration affects the nerves of sight and we recognize it as light. If the vibration comes from a solid body, as from the sun, from the fine particles of carbon in a lamp or from a molten body, the vibrations are of all rates of frequency and all the colors of the spectrum are present, but intimately mixed and blended, we see only the white light.

The discovery of the X-rays is due to the investigation of the effect of the electric spark upon the atmosphere. If an electric spark is passed through a tube or vessel containing air the effect is the same as when passed through the outside air, but if the air in the tube is partially exhausted by means of an air pump, the spark becomes broader, has less of a zig-zag direction and with less noise. If the air is withdrawn as much as possible by the pump, there is no longer any spark, but the whole vessel is filled with a beautiful purplish light. In the Geissler tubes, which are from six inches to several feet in length and from one-half to two inches in diameter, from which the air is almost but not entirely exhausted, hermetically sealed and fitted with platinum wire at each end, the electric current can be passed through the rarefied atmosphere, pro-

ducing a brilliant light—purple, if the tube contains air only; red, if it contains hydrogen, and various other colors with other and different gases.

In the Crookes tubes, a modification of the Geissler tubes, the attenuation of air is carried to so high a degree that it is estimated that a millionth part only of the ordinary atmospheric pressure is present. In seeking the rationale of the phenomena exhibited it may be said that the particles of the gas contained in the tubes when excited by the electric current vibrate, each particular gas at a definite rate of speed, in a similar manner to the vibration of the strings of a musical instrument, each string vibrating at a certain rate to produce the note to which it is attuned. In considering the X-rays we must remember they are ultra ultra violet; in fact, way beyond the violet; therefore, the waves are so short that they are invisible, so that in some way we must account for the light when we see. It is done as follows: If we regard the tube as a small box filled with small balls, the balls representing the molecules of gas, on shaking the box, as the balls cannot move, there will be no sound. If some of the balls are removed, the air withdrawn in the case of the tube, allowing the remainder to move freely, on shaking the box the balls will be thrown from side to side. If nearly all of the balls are removed or the air exhausted and the box violently shaken, the few balls left will strike against the sides of the box with much force. In the case of the Crookes tubes, where the rarefaction is very great, the particles of air are hurled from one end of the tube to the other with such force as to beat the walls of the tube or any object they may strike in the same way as a piece of iron can be made red hot by hammering. These particles of air may be driven against the walls of the tubes with such force as to crack them or melt them by the heat produced. It has been found by Nikola Tesla that particles of air may be forced through the glass. This impact of particles against the sides of the tube imparts to the luminiferous ether a peculiar vibratory motion, which is continued through wood, metals, flesh, bone and other opaque objects, and after having passed through them is still capable of affecting a photographic plate and of bringing out fluorescence.



Other rays which are used in medicine and surgery are as follows:

*Ultraviolet.*—If we compare the Roentgen rays with the ultraviolet radiations we will note some resemblances, but still some notable differences in their physical manifestations:

#### X-RAYS.

1. Cannot be reflected, refracted or polarized.
2. Can penetrate and traverse many bodies that will not permit the passage of luminous rays—e. g., wood, aluminum, etc.
3. Will readily traverse the superficial tissues and influence the nutrition of the deeper ones.
4. Will traverse a thick book.
5. Have no appreciable effect on the vitality of bacteria.
6. Will discharge an electroscope, either positively or negatively electrified.
7. Will excite bright green fluorescence in willemite and induce white phosphorescence in polysulphide of calcium.
8. Rock salt is opaque to X-rays.

#### ULTRAVIOLET RAYS.

1. Can be reflected, refracted and polarized.
2. Will not traverse many bodies that are perfectly pervious to luminous rays—e. g., glass.
3. Will not influence the deeper tissues, nor even the superficial ones, unless they are deprived of their usual blood contents; that is, dehematized.
4. Will be stopped by a single leaf of the same book.
5. Will rapidly destroy the vitality of bacteria.
6. Will discharge an electroscope if electrified negatively, but not positively.
7. Will excite bright green fluorescence in willemite and induce *blue* phosphorescence in polysulphide of calcium.
8. Rock salt is transparent to ultra violet rays.

The differences here pointed out indicate the fact that we are dealing with agents of totally dissimilar nature, although in certain forms of disease they may both be used to effect the same end; that is, in the treatment of cutaneous affections of an extremely superficial character, while X-rays may further be used for the successful treatment of deeper lesions.

*Lenard Rays*, discovered in 1894, have the power of penetrating thin sheets of metal and of producing photographic action, as well as discharging electrified bodies. They are also deflected by the magnet. They differ from Roentgen's rays in their penetrative power, for air is relatively opaque to them.

*Becquerel Rays*.—The Becquerel rays are invisible radiations emitted from the salts of the metal uranium, as, for example, the nitrate of uranyl and the fluoride of uranium and ammonium. These and other salts of uranium, whether in dark or light, emit a sort of invisible light, which can pass through aluminum and produce on a photographic plate shadows of metal objects. Becquerel's rays possess, like ultraviolet light (though to a lesser degree by reason of their lesser intensity), the property of diselectrifying charged bodies. These rays are absorbed by air. Water is transparent to them. Metallic solutions are transparent, as also are wax and paraffine; uranium glass and red glass 2 mm. thick are fairly opaque. There appears to be no doubt that the uranium rays are a species of extreme ultraviolet light having a wave length certainly less than ten microcentimeters and a frequency certainly greater than 3,000 billions per second.

*Phosphorous Light*.—Professor Thompson has examined the penetrative effect of the pale light emitted by phosphorus when oxidizing in moist air. It is accompanied by some invisible rays which will penetrate through black paper or celluloid, but will not pass through aluminum. He found that they emitted rays which, after filtration through card or through copper plates, would act photographically. These rays can be reflected and probably refracted and polarized. He used about 1,000 fireflies shut up in a shallow box over the screened photographic plate.

*Wiedmann's Rays*.—Professor E. Wiedmann, in 1895, described some rays named by him discharge rays, which are produced in vacuum tubes by the influence of a rapidly alternating electric discharge. They have the property of exciting in certain chemically prepared substances, notably in calcium sulphate containing a small percentage of manganese sulphate, the power of thermo-luminescence. In other words,

the substance after exposure to these rays will emit light. When subsequently warmed they are emitted at lower degree of rarefaction than are necessary for producing the X-rays. They are emitted from all parts of the path of the spark discharge, but more strongly near the cathode. They are propagated in straight lines, but no reflection of them by solid bodies has yet been observed. They are readily absorbed by certain gases, but their production is promoted by hydrogen and nitrogen.

Professor Thompson has recently found two new kinds of cathode rays. One he terms parakathodic and the other diakathodic ray. The parakathodic ray is produced when ordinary cathode rays strike upon an antikathode, as in the focus tubes. If the vacuum is low, there are emitted from the antikathode, in nearly equal intensity in all directions, some rays that closely resemble ordinary cathode rays. They can be deflected electrostatically and magnetically, and can cast shadows of objects on glass walls. If the vacuum is high enough for the production of Roentgen rays some parakathodic rays are produced at the same time. They cause the glass bulb to fluoresce over an obliquely limited region. The diakathodic rays are produced by directing the ordinary cathode rays full upon a piece of wire gauze or upon a spiral piece of wire, which is itself negatively electrified. The ordinary X-rays refuse to pass through the meshes of the gauze, but instead there passes through a beam of bluish rays which differ from cathode rays in that they are not directly affected by a magnet. These diakathodic rays can also produce fluorescence of the glass where they meet the walls of the tube, and can cast shadows of intervening objects; but the fluorescence is of a different kind.

*Goldstein's Rays.*—Herr Goldstein has also described some rays apparently closely akin to those just mentioned. If a perforated disk is used as a cathode there are produced some blue rays which stream back behind the cathode opposite opposite the apertures.

*Radium.*—This new element is about 225 times as heavy as hydrogen. Radium, in its general chemical characteristics, is a member of the same group of elements as calcium. When

radium salts or mixtures rich in radium salts are brought near the closed eyes or to the temples a peculiar sensation of light is perceived, not only by those who possess efficient eyes, but by the blind. Radium owes its name to the property which it possesses of emitting spontaneously visible rays in darkness. Radium always emits in darkness a perfectly distinct light. Besides, outside of its own luminescence, which is shared by its compounds, it has the power of imparting luminescence to others. This is the reason why substances which become phosphorescent under the action of ultraviolet rays are illuminated in the vicinity of the radium. On the contrary, substances which become phosphorescent in red light remain inert near radium. The degree of luminosity depends evidently on the distance from the radiant source. Moreover, radium transmits to certain metals placed under its influence the property of emitting in their turn radiations. This is called secondary of induced radioactivity; under the radiating action of a particle of radium a screen of platino-cyanide of barium or of tungstate of calcium is lighted up, as it would be in ultraviolet rays.

The Crookes tubes emit two kinds of rays—cathodic rays lodged in the interior, going from the cathode (—) to the anode (+) and propagated like light in a straight line, but with only half its velocity; and the X-rays or Roentgen rays, which only originate at the points where any matter whatever—solid, liquid or gaseous—arrests the cathodic rays in their passage. The X-rays in the tube focus start, therefore, from the metal plate of the anode, which the cathodic rays have struck, then traverse the glass and are uniformly distributed in every direction near the tube. The radium rays possess at the same time the property of the cathodic rays and of the X-rays. Like the cathodic rays, the rays which emanate from radium are deflected by the magnet; the cathode rays are totally deflected, the radium rays only partially. A part of the rays remain neutral under the influence of a magnetic field, which leads us to suppose that radium possesses two different species of radiations. The velocity of propagation of radium rays is also half of the velocity of light.

*Finsen's Light.*—Finsen first found if a number of earth

worms were placed in an oblong box covered half with red glass and half with blue glass, that the worms will always crawl away from the blue glass and lie under the red. On summing up this and many other experiments he found that all the red or heat rays could do was burn when intense enough, as fire burns. But the actinic rays, which do not burn, have other properties that may render them very beneficial or harmful to animal life. Thus it is the active rays that produce ordinary sunburn—really not sunburn at all, but an irritation of the skin. He has turned these observations to a practical use in medicine.

*The Peter Cooper Hewitt Light.*—Mr. Hewitt's mercury vapor light is a light in which the red rays are totally absent. It will probably be of value in medicine chiefly as a means of diagnosis, as the appearance of a person under that light is very ghastly, there being no red rays in the light. The result is that any red spot or particle of red on a person or object observed becomes a deep purple. The value of this lamp will thus be evident. What, on an ordinary skin or mucous membrane, would appear red, either faintly or more distinct, will now have a distinct purple appearance; therefore, a mild inflammation or rash may be earlier and more clearly detected.

*Mode of Action of the X-Rays on Diseased Tissues.*—The mode of action has not as yet been clearly determined. Their action was at first believed to be mainly bactericidal. This theory had, however, to be given up for two reasons. On the one hand, it is very doubtful whether the rays possess the property of destroying micro-organisms—indeed, the majority of investigators believe that they stimulate their growth; on the other, good results have been obtained in diseases the production and evolution of which microbes play no part whatever. Their effect has also been attributed to the corrosive action of minute platinum particles; to the generation of ozone in the skin and to electric waves given off from the tube. They appear to have marked influence in retarding osmosis. Some authorities think it possible that it is in this property of the X-rays that the secret of their biological and therapeutic action lies. By retarding the osmotic processes throughout the system they cause changes in the intimate condition of cells,

constructive or destructive, which must have an influence on the nutrition of the tissues. On the skin the X-rays often cause an inflammatory reaction varying in intensity according to the distance and the degree of exhaustion of the tube; the quantity and potential of the current, and the construction of the interruptor, coil or other apparatus employed.

Neisser compares the action of the rays on the skin to the local action produced by tuberculin. Kaposi held that they acted upon the blood vessels, producing an alteration in tone, bringing about healing and absorption of the granuloma by fatty degeneration or molecular change. Scholtz experimented on various animals and found microscopic changes, consisting of swelling and edema of the epithelial cells and champing and shrinking of the nuclei, with a clear space in the cell protoplasm. Splitting of the nucleus in cell division was rarely seen, but many of the epithelial cells showed nuclei which seemed to be in process of dividing. There was marked edema of the corium, its fibers being swollen and staining badly, the elastin being more resistant than the collagen. The connective tissue cells were affected in a similar manner to those of the outer layer of skin, as also were the cells of the sweat glands, the hair follicles and the intima of the large blood vessels. There was abundant inflammatory infiltration of cells, chiefly leucocytes. Masses of leucocytes were present beneath the epidermis; the mast cells in the corium were increased. Toward the center lesions there were superficial vesicles in the stratum corneum. Scholtz concluded that the rays cause a slow degeneration of the cellular elements of the skin, both of the epidermis and corium, the nucleus as well as the protoplasm being affected. There is also a less marked degeneration of the fibrous elements. As soon as the cellular degeneration reaches a certain degree an inflammatory reaction occurs in which the blood vessels become dilated and the usual phenomena of inflammation take place—namely, an extravasation of serum and leucocytes. The latter seem to act as phagocytes and completely destroy the degenerated cells. The microscopic changes caused by the action of the X-rays on the tissues are numerous, interesting and varied.

*The Physiological Properties of Radium.*—The physiological

properties of radium rays are especially remarkable. While the prolonged application of the X-rays produces on the skin a simple erythema, perhaps the falling out of the hair or even a burn, radium produces a veritable burn—an almost intractable burn. It yields only to treatment of months. M. Becquerel was accidentally the victim of these deadly rays by carrying in his pocket a tube containing a few decigrammes of slightly active radiant matter. M. Curie, voluntarily in the cause of science, devoted himself with true heroism to their cruel attack and sacrificed a part of the skin of his arm. The direct contact of radium causes in a short time a dropping off of the skin, followed by severe and persistent pain. The vegetable world is as susceptible as man. The seeds of mustard and garden cress, exposed to the corrosive influence of radium, lose their germinating power. This is wonderful, but not so astonishing as the fact that all these different effects, some more singular than others, are produced by a single particle of metal through a double covering of glass, without this magic power being diminished by time. It appears from reliable calculations that with radium the loss of substance caused by the radiating energy of one cubic centimeter would be one milligramme in a thousand million years.

*How to Achieve Results by Means of the X-Rays.*—It is highly important that the result of the X-rays treatment should be emphasized by a full and detailed publication. There is undoubted evidence that the benefit to be derived from the X-rays is almost illimitable. The great aim of those who adopt this method of treatment is to endeavor to utilize to the fullest the healing qualities and power of the rays. Keen observation and sound judgment are essential and we should have no hesitation in asserting that the success obtained is in proportion to the exercise of these faculties. The results already achieved are of an excellence and endurance sufficient to give substantial indication of what one may expect from the rays in, let us hope, the near future.

*Attention to Detail*—The character of the coil, the voltage used, the condition of the tube, the distance of the patient from the instrument, the duration and frequency of the sittings and the intervals between each, and also whether or not any other

treatment is applied—these are details which are many times overlooked, but are of great importance. No hard and fast rule can be adopted, but the effect of the rays can be applied to individual cases and regulated to suit the various stages of a disease by strict attention to the above injunction. This applies more specially to the condition of the tubes and to the limitation or extension according to requirements of the exposure given the patient. Different tubes have different capabilities, and a good tube usually comes only by careful nursing and attention. There are many who place too great reliance on the length of the sitting. In many articles I have read the period of exposure adopted by the writer was stated to be from ten minutes to an hour every day. This is not the best way. It should always in using these waves be the object to obtain as rapidly as possible a tangible result consistent with safe treatment, because we do not know all of the properties of the light we are using.

*Rays and Operation Compared.*—The advantages of the X-rays over operative treatment are principally in effect. After healing they leave a soft, pliable skin, devoid of contraction, and the face is not disfigured by unsightly scars, which are the inevitable consequences of the use of the knife. The risk from anesthetics is obviated and the patient cured without pain or shock. It is an established fact that in many skin diseases the application of the X-rays abolishes the necessity for operation. Those under treatment can also at the same time carry on their ordinary avocations. Many who fear the danger of operation hesitate and in this way the disease is spread and becomes more difficult to cope with. This is a general and broad view to take of the question and its lesions. \*

*Comments.*—The above article handles the physical principles of radiation in a very satisfactory manner. Certain minor errors, however, illustrate the difficulty of dealing with these principles, and while we point out these errors we do not wish to detract from the excellence of the paper.

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\* References—John McIntire, *British Medical Journal*, June 6, 1903; Malcolm Morris, *British Medical Journal*; Works by Curie, Professor Thompson, Crookes and others.



The "undulatory" theory does not apply to sound waves because these waves are propagated in the atmosphere and not in the ether. The frequency of sound waves ranges from 16 to about 12,000 vibrations per second. It is the mechanical motion of the air particles in the sound wave that produces the mechanical motion of the tympanic membrane which is transmitted to the ossicles of the middle ear and these in turn transmit the vibration to the labyrinthine fluid. The filaments of the auditory nerve respond to these mechanical vibrations sending a nerve impulse to the brain. An ether wave not being mechanical motion, would not affect the apparatus of the ear which respond only to mechanical vibration.

It is customary to speak of the ether as a substance pervading all space which seems to have the properties of a solid body rather than of a gaseous body. Gases and liquids are able to transmit only longitudinal waves, while a solid body may transmit transverse waves. On the undulatory theory, light waves consist of transverse vibrations, and only a solid could transmit these. This solid, however, is rarer than any gas and does not obey the laws of gravitation, for if it did it would gather at the surfaces of planets and leave the great inter-planetary spaces entirely vacant. It is thus seen that the ether is not ordinary matter and we must suppose it to have properties which are entirely impossible in ordinary matter.

The explanation of the vacuum of the Geissler Tube is unfortunate because it is not "almost but not entirely exhausted." To be sure, the amount of gas remaining is small, being only about one one-thousandth of its former pressure. The vacuum of the Crookes Tube is carried to a point fully a thousand times more nearly to a perfect vacuum—that is, its vacuum is about the one-millionth of the ordinary pressure.

The explanation of the phenomena within the Crookes tube is misleading, because it cannot be said that "the particles of gas contained in the tubes when excited by the electric current vibrate, each particular gas at a definite rate of speed, in a similar manner to the vibration of the strings of a musical instrument." A vibration does not mean a bodily advancement through space, but a to and fro motion, whereas the particles that compose the cathode stream are hurled with great velocity.

from the cathode. According to the view of Thomson, Stokes, Crookes and others, these particles are not molecules of the gas nor its atoms, but small bodies called corpuscles, which have a mass about one one-thousandth of a hydrogen atom.

The word "wave-length" is applied only to a set of regular waves or to a set of irregular waves, which can be resolved into regular waves; thus it would be incorrect to speak of the wave-length of light as such, because light is an irregular vibration compounded of a great many regular vibrations, namely, the waves which produce prismatic colors. The blue, red and other waves are regular and have definite lengths. According to the above named physicists, the X-ray is an irregular wave which has not been resolved into anything regular as yet, so we ought not to speak of its wave-length. It is possibly composed of regular waves which by their assemblage produce a resultant irregular wave, in which case we could then definitely speak of the wave length of its components. It is too soon, however, to speak of their relation to the visible spectrum excepting to say that IF they do at all resemble light vibrations, they are, as the writer says, very far beyond the violet, occupying a broad space in the spectrum.

These rather extensive remarks do not detract from the general exposition of the author. He has linked together the radiations of visible light and the ultra-violet light with radiations which at first thought could not be considered similar. Without a doubt future researches will demonstrate that the radiations from uranium, polonium, thorium and radium are not altogether different from the X-ray on the one hand or ultra-violet light on the other, but we are hardly warranted in drawing very definite conclusions at the present time. The complexity of these radiations is already demonstrated, some of the experimenters holding that X-rays, cathode rays and ultra violet ray are given off from radium.

#### THE PRESENT STATUS OF THE X-RAY TREATMENT OF MALIGNANT TUMORS.

By William M. Coley, M. D., N. Y.

The paper of the above title was read at the New York Surgical Society in November, 1902. After commenting on

the work done by various operators in Chicago, New York and Boston, he reports some of his own work. Total number of cases was 75; 25 of sarcoma, 21 carcinoma, 15 cases of epithelioma and 11 cases of abdominal cancer. Of the sarcoma, 6 were located in the neck, 3 in the thigh, 3 in the parotid gland, 2 in the pectoral region, 2 of the testes, 3 in the abdomen and 1 each in the femur, back, frontal sinus, iliac fossa, chest-wall and superior maxilla. We give in detail the history of one of these cases.

Case II—*Round-celled Sarcoma of Femur, Involving Two-thirds of Shaft.*—A. G., aged 19 years. Swelling first noticed in lower portion of left femur in November, 1901. This gradually increased in size, being accompanied by loss of weight and deterioration of general health. Feb. 5, 1902, physical examination showed a large tumor extending from the condyles of left femur to the junction of middle and upper third. There was a fusiform enlargement of the entire lower two-thirds of the femur. On the outer aspect of the thigh, about one and one-half inches above the joint, there was a soft, fluctuating area just covered by thin and reddened skin. There was a slight impairment of the functions of the joint itself. An incision was made, under ether, into the fluctuating area and two to three ounces of clear serum, similar to that which is found in cystic degeneration of carcomatous tissue, was evacuated. A curette was passed into the cavity of the bone and typically sarcomatous tissue removed. Microscopical examination by Dr. E. K. Dunham showed it to be a round-celled sarcoma. The patient absolutely refused operation. The X-Ray treatment was tried entirely as an experiment, four exposures a week being given for a month, at the end of which time the circumference of the tumor had decreased one inch. The treatment was discontinued for two weeks, during which interval the tumor had again increased nearly an inch. The treatment was resumed, and at the end of another month the circumference of the thigh over the center of the tumor was one inch less than the original measurement. The treatment was continued the entire summer up to December, 1902. In June he developed some rales in the chest which caused suspicion of lung metastases, but this condition cleared up, his

general health improved and he gained twenty pounds in weight.

Dec. 1 measurement of the left leg was the same as that of the right. There was still some thickening in the lower part of the femur. The old sinus, which had never healed after the exploratory incision, was enlarged under ether and carefully curetted. Examination of the tissues failed to show any trace of sarcoma.

Jan. 15, 1903: During the past six weeks the patient has lost considerable weight, about twelve pounds, and while the leg shows no increase in size, he has slight evening rise of temperature, suggesting possible metastases.

Jan. 21, 1903: Careful physical examination shows a metastatic tumor about three inches in diameter in the left pectoral region, freely movable and apparently situated between the muscle and superficial fascia. There is also a small, deeply situated mass in the lower dorsal region just to the left of the spinous processes. These masses are undoubtedly metastatic tumors and account for the recent loss in weight. The tumor in pectoral region was removed under ether anæsthesia Feb. 4, 1903, and was typical round-celled sarcoma.

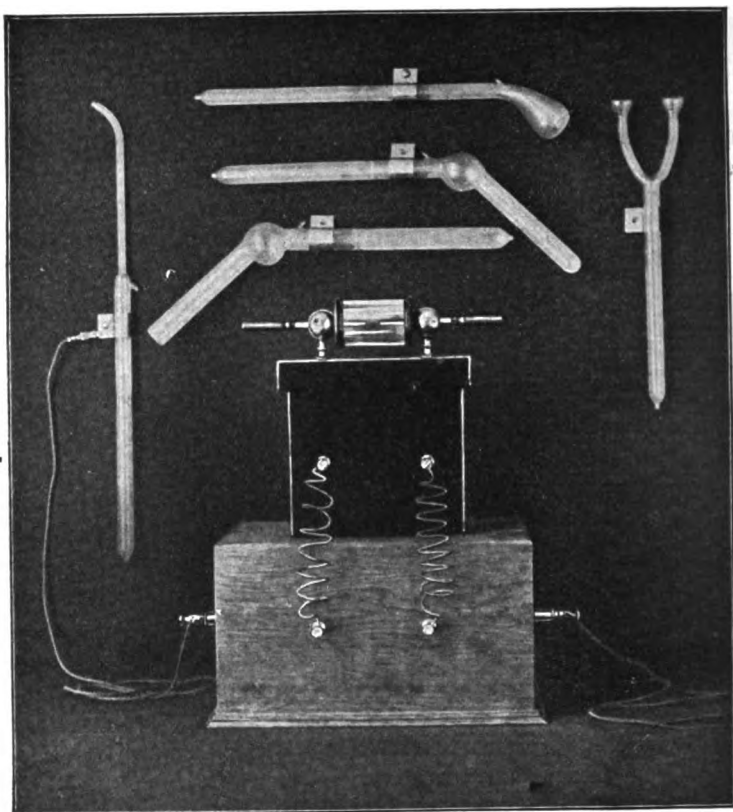
*(New York Medical Record.)*

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#### BOOK REVIEW.

A Manual of Electro-Static Modes of Application, Therapeutics, Radiography and Radiotherapy (second edition). By Wm. Benham Snow, M. D.

This is one of the most useful and practical manuals we have seen on the uses of the static machine. The author is well fitted to write a treatise on this subject because he has had an extensive experience. He knows, moreover, how to describe his technique in a concise manner. The various methods of employing the machine are explained and illustrated by diagrams. The author also gives a discussion on the uses of the X-ray as a diagnostic and therapeutic agent with clinical reports of a number of his cases. The book is bound to be very popular among electro-therapeutists and it deserves very careful reading.



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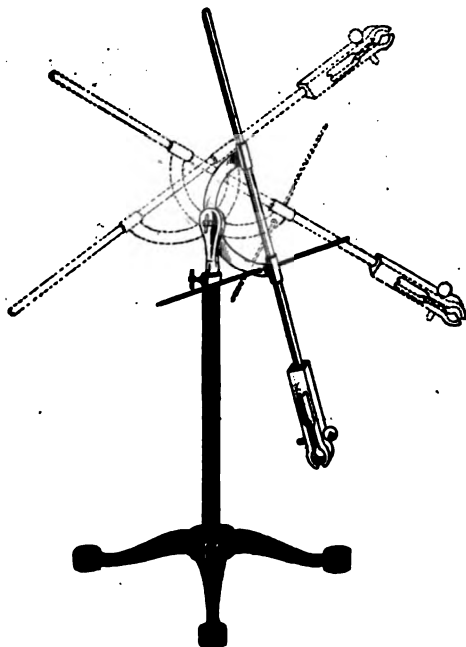
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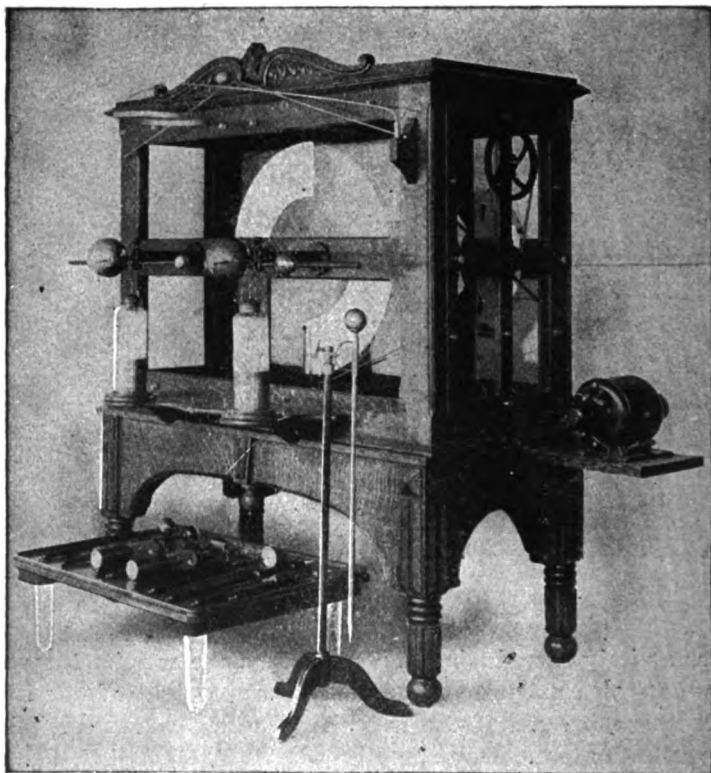
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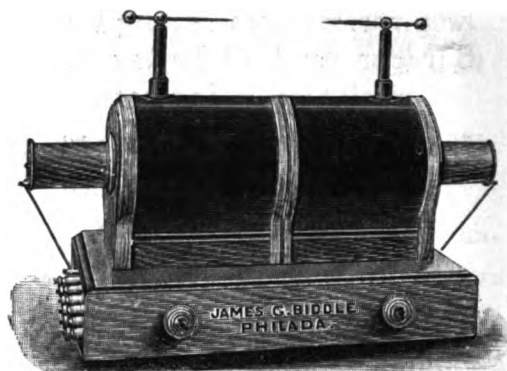
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# American Electro-Therapeutic and X-Ray Era

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## Original Contributions.

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### LUPUS HYPERTROPHICUS TREATED WITH X-RAY.

Mrs. L. LeR., age sixty-three, had had lupus, affecting the nose and left cheek, for fourteen years, during which time she



FIG. 1.

had been treated by various physicians. Her present attendant, Dr. E. G. Cromwell of this city, sent her to me. There was a

characteristic patch spreading over the bridge of the nose, the left lower lid and occupying a generous portion of the adjoining part of the cheek. Fig. 1 represents the case when she presented for treatment, July 23. The diseased area is of very striking appearance, as it presents at the same time the various phases of evolution and involution of the malady. On the nose are seen two deep ulcerations, on both nose and cheek are a few primary spots, while cicatricial markings and papillary outgrowths are plainly visible. There are papules and tubercles, some unchanged and others undergoing the



FIG. 2.

process of ulceration. Photograph for Fig. 2 was taken immediately following the ninth sitting and shows a marked improvement for so short a time and small number of exposures. The ulcerations, both deep and superficial, have healed, and most of the prominent infiltrations have disappeared, leaving the surface much smoother.

The nine sittings covered a period of sixteen days and occasioned a slight reaction, as manifested by itching and erythema, so the patient was sent home for ten days' rest. August 19 treatment was renewed, giving thirty exposures in sixty days. A small patch of tubercles near the inner canthus of eye proved very stubborn and claimed the majority of these thirty sittings. At no time was there a very decided X-ray reaction. After the first two weeks there was a steady improvement and at present time there is a complete symptomatic cure, as shown in Fig. 3. Technique: An old soft tube, me-



FIG. 3.

dium light, actuated by a twenty-four (twenty-four inch) plate static machine. Time of each exposure, ten minutes. Distance, two to three inches, measuring from surface of the tube. Sittings, daily, stopping for a few days at appearance of slightest reaction. This has been my standard technique in the treatment of all cases, while in some cases it may seem

slow, I am sure it is by far the safest method. The lips, eyes and hair were only parts protected from the light. The patient lying on the back, the hair of head was guarded by means of an ordinary eye shade, covered with lead foil and placed in a reversed position on the forehead. The eyes and eyebrows by a piece of sheet lead one thirty-second inch in thickness, cut to shape somewhat after the pattern of eye lense frame, that portion covering left eye, so arranged as to expose inner canthus and by its weight push the lower lid down into area of light, thus protecting all the conjunctiva, which I have found to be very susceptible to the X-rays.

E. S. FERRIS, M. D., Henry, Ill.



### THE X-RAY AS A BEAUTIFIER.\*

By Noble M. Eberhart, M. S., M. D., F. S. C. (London), Professor of Electro-Therapeutics, Post Graduate Medical School

The X-ray has rapidly come into prominence as an agent for the treatment of many and various ills.

There are still many conscientious physicians who believe it has no value except in locating bullets and broken bones, while, on the other hand, there are many who believe they have found in it a panacea for all the ills of man and beast. Somewhere between these two extremes are found physicians with enough good, plain, everyday "horse-sense" to be willing to give the X-ray its due place as a valuable agent, both diagnostically and therapeutically, without trying to monopolize the whole field of medicine and surgery.

Possibly I may be criticised for taking up your time in considering the cosmetic effects of the ray, but it seems to me that it is the inherent duty of every person to make himself or herself as presentable as possible in the eyes of the rest of the community, and therefore the physician should do all in his power to bring this about. We admit the necessity of wearing suitable apparel and of keeping the person neat; not only for our own benefit, but as a duty toward our fellow-men. The

\*Read before the Chicago Electro-Medical Society, October 27, 1903.

ophthalmic surgeon straightens cross-eyes when vision is not materially affected solely for the effect on the personal appearance. He also injects paraffin after enucleation and fits a glass eye for the same reason, or tattoos the cornea of an eye. The removal of benign tumors from the face, straightening crooked teeth, etc., are other examples of a similar nature. Of course, the treatment of lupus and epithelioma, when of the face, has marked cosmetic properties, as may be seen by referring to the "Before and After" pictures to be found in all X-ray treatises.

It was my intention, however, in this paper to dwell more particularly upon the effect of the X-ray upon those conditions which in themselves were no menace to the life or health of the individual, but simply unsightly or disfiguring in character. Of these the one most frequently met with is *acne vulgaris*. The magnificent results obtained in treating this disease are well known to every X-ray operator, and I can scarcely add anything to what is already known upon this subject. In so far as this particular disease is concerned I have been converted from the position of a skeptic to a most ardent and enthusiastic advocate of the X-ray, so that I now believe every case of acne can be cured by it.

It is not my purpose or desire to discuss the etiology or pathology of acne, nor to give a number of cases which would simply be similar to those already reported by other operators. I prefer merely to dwell upon a few points concerning the treatment that have specially impressed me.

In the first place, the patient must be given to understand the necessity of keeping up the treatment for a considerable time, whether or not any benefit is apparent. I ordinarily anticipate perceptible improvement in four to six weeks and a cure in three or four months. I give seven to ten minute treatments daily, up to eight or ten treatments, and then three or four times a week until reddening or pigmentation is noticeable, after which I carry along the treatment cautiously until cure is effected. Attention has been called by various authorities to the simultaneous appearance of erythema and improvement. This erythema apparently indicates a little over-dosage and if



we understood absolutely the regulation of the dosage I believe the cases might all be cured without any such manifestation. I would compare it to the action of a drug where it is pushed until we note the transition from the physiological to the pathological or toxicological action.

One thing that I have noticed is that the ray has no perceptible effect upon the scars where former pustules have been lanced, unless there is possibly a slight contraction in their size.

Except in unusual cases I use absolutely no medicines or ointments in connection with the treatment. Once the physician demonstrates to himself that acne can be cured with the X-ray alone, he will not be so anxious to drug his patient, which seems like admitting that one has no faith in his X-ray treatment. In occasional cases the general condition of the system may be such as to call for special medication, but it should only be in cases where the same medicines would be indicated even if the patient had no acne.

Nor do I believe in always lancing the pustules, as a scar usually follows. The X-ray will take care of all these pustules if they are left alone, or if they must be meddled with let them be opened carefully on the surface, when they show a yellow head, using no force in expelling the pus, merely affording a vent for it and then applying dioxygen. Strong pressure is apt to drive the infection into surrounding tissues and breaks down healthy structures, which in turn cause more pus.

I note that the X-ray does not immediately prevent the appearance of successive crops of pimples, but as the treatment progresses these outbreaks heal more and more readily until they finally fail to materialize. I will not consume any further time considering acne, except to cite four very obstinate cases, in three of which a cure was effected without any appearance of redness at any time.

Case 1.—This case in a young woman of 27 was the worst case of acne I have ever seen. Her face was covered with papules, pustules and even tubercles. In several places six or seven pustules would coalesce into one large one. If I had had at that time the same faith in the X-ray that I now have, I certainly should have tried to obtain a photograph of the case at this time. The young woman was a stenographer, and such

was the horrible appearance of the face that fellow employees objected to working with her, believing she was suffering from specific blood poison, and she was discharged from her position. She came under treatment Aug. 28, 1902, receiving seven-minute treatments every other day with a medium tube. At the time of the eighth treatment I fancied there were signs of improvement in a few places on the skin. After fifteen treatments I used a very low tube, and when twenty-five treatments had been given without any dermatitis I began giving the exposures daily, with only an occasional skip, until about sixty sittings were given, when considerable redness appeared and the exposures were given two or three times a week. They were continued in this way, until after six months the face was practically clear and only an occasional exposure was given during the next two months, when they were considered no longer necessary.

Case 2.—Young woman of 25. Had suffered from acne since 13 years of age and had been through all forms of treatment. Daily seven-minute exposures, up to ten; then three times a week, the time varying from eight to twelve minutes. After two months no redness had appeared, nor did the face seem to be any better. Treatments were then given daily for five weeks, when marked improvement was noticeable. Continued on an average of four times a week for another two months, when acne had disappeared. At no time was the slightest erythema noticed.

Case 3.—Kindergarten teacher. Case was not very severe and three ten-minute treatments per week were given with low tube. After two months, neither redness nor improvement appearing, treatments were pushed for thirty days, when acne rapidly disappeared and treatments were discontinued. No discoloration of the skin could be noticed at any time.

Case 4.—Young woman of 23. Unusually bad case of pustular acne of seven years' duration. Daily seven-minute exposures with low tube until ten were given. Then four times a week. At the end of eight weeks the face was much worse than at the start and treatment was given daily of fifteen minutes' duration, in expectation of soon producing redness or

pigmentation. They were kept up for a month without any erythema, but with a very rapid disappearance of the sores. Continued three times a week until cured, five months in all. The complexion was left remarkably fine in this case, the skin was very smooth, soft and white.

The removal of superfluous hair from the face and arms has been more or less satisfactorily accomplished with the X-ray, usually most successful when least expected or desired. In my own experience it works admirably in about one-half of the cases and fails absolutely in the other half. I no longer recommend it to prospective patients, although, of course, willing to undertake the treatment when desired. Possibly I have not obtained as good results as some on account of being unusually conservative and unwilling to take unnecessary risks of producing burns. Two cases illustrate my experience.

Case 1.—Woman of 30, with profuse downy growth of hair on cheeks, chin and upper lip. Ten-minute exposures with medium tube three times a week. Hair dropped out after twelve treatments. Exposures two or three times a month for three months after. It is now nearly a year and there has been no return.

Case 2.—Young woman of 25. Teacher. Long hair on chin and upper lip. Not coarse nor very thick. Mother has always been troubled the same way. This case came under treatment in January, receiving three or four ten-minute exposures per week almost continuously up to the present time, with apparently no marked benefit. Many of the smaller hairs have disappeared, and a co-existing acne has been cured, but the larger hairs show no signs of dropping out, or, in short, any improvement whatever. No pigmentation or erythema is present, nor has existed at any time, although the treatments have been lengthened to from fifteen to twenty minutes; but since Sept. 1 it has only been possible to give one treatment a week.

In cases of blackheads, large pores and coarse, oily skins the X-ray produces very satisfactory results. This effect was first noticed by me where these conditions existed in connection with acne, and I observed that they yielded to the rays more quickly than the acne itself. It is not unusual to see a perceptible de-

crease in the size of the pores in even four or five treatments. The blackheads and sebaceous material become dry and are easily expressed. The action of the ray in these conditions seems to be based upon the effect it has to cause atrophy of the skin and all of its elements. The treatments are best given in five to ten minute sittings every day for five times; then three times a week. In this way no annoying effects of the ray are likely to appear and the case progresses steadily to a favorable termination. Treatments should be kept up two or three times a month for some time after cure has apparently been made to insure permanency of results.

I now combine with the X-ray the high-frequency current and vibratory massage.

Case 1.—An Italian girl, age 21, with very large pores, blackheads and a coarse, rough, oily skin. Nov. 10, 1902 treatments were commenced and given three times a week. Improvement appeared in three weeks and case was discharged cured Jan. 19, 1903. I saw this young woman a few weeks ago and the skin was soft and smooth and the pores of normal size.

Case 2.—Young woman of 20; stenographer. Blackheads, large pores and rough skin. A few acne papules appeared each month at menstrual period. Three treatments a week for ten weeks resulted in a beautiful skin. This young woman still comes in for an occasional treatment, but there has been no indication of a return of the trouble.

Case 3.—This case is essentially similar to case 2 and yielded to three months' treatment, with no return.

Case 4.—Muddy complexion, blackheads and excessive oiliness of skin. This young woman was here on a visit and anxious to be cured in a hurry, so daily treatments were given for two weeks. The pores contracted nicely. The oiliness disappeared, but the blackheads, though not as plentiful, could by no means be considered cured, and she was advised to continue treatments in California, whither she was going. I cite this case only as illustrating how quickly the sebaceous glands may be affected by the ray. Jutassy, Schiff & Freund and others report equally as satisfactory results.

I have treated one case of acne rosacea, which was obliged to discontinue treatment at the end of 60 days, having had 30 treatments in that time with slight erythema and pigmentation. There was little or no improvement in the case at this time, but I do not consider it a fair test of the X-ray, as it would naturally take a considerable time in a case of this kind. Monell cites two cases of Hahn's in his text-book; and Zeisler, Pusey and others have reported cures.

Alopecia areata has been successfully treated by the X-ray. Kienboeck reported a case in the Berlin congress last November that was cured in six 15-minute exposures. Monell mentions a case of Startins cured in one treatment. Holzknacht also in 1900 reported several cases.

In syccosis the ray has indeed proved a boon to the profession. Pusey gives an extensive bibliography referring to the reports of Schiff and Freund, Hahn, Spiegler, Rinehart, Schultz and others abroad. He reports one case in detail.

I have had no experience with the ray in naevi or other birth-marks, but several cases have been reported. Freund reported a case in 1897 in which the hair was removed from a hairy naevus. Pusey reports one case in a child of 2 years in which the hair was removed from a pigmented naevus on the forehead, as well as the pigmentation and hyperkeratosis, so that the skin was smooth and almost its normal color. He also reports a case of vascular naevus of the face and neck in which after the subsidence of an acute dermatitis produced by the treatment there was marked improvement in the color, showing that without doubt a large number of telangiectases were destroyed. He considers it is possible by setting up an acute dermatitis to produce scar tissue which will contract and shut off the blood from the vessels and cause them to atrophy. Jutassy reported in 1900 two cases of portwine mark treated with the X-ray. In one case the aggregate sittings amounted to 14 hours, and after the healing of the dermatitis the mark had disappeared, leaving a smooth, whitish scar. The second case was equally successful. Theoretically the X-ray should certainly cure all of these cases.

In conclusion I will refer for a moment to the subject of X-ray burns. This is of considerable importance when one is

treating the face, for a burn would be very unpleasant and conspicuous, and cause much unfavorable comment. During the last year my records show that I have averaged from 15 to 25 treatments daily on the face, without producing a single burn. This I attribute to the fact that I am very careful not to give unduly long exposures and also I believe to the fact that the coil I use requires but a small amount of current to excite the tube. In all facial work I never use a current intensity to exceed  $1\frac{1}{2}$  or 2 amperes.

103 State St., Chicago.

#### DISCUSSION.

Dr. Boomer said he had not treated acne with the X-ray, as he had not much of the skin practice. He wondered whether the erythema had not cured the acne, and if so he was inclined to think that he would take a slight chance and produce the reaction earlier in the treatment. He had not succeeded in curing eczema without producing this reaction. It seemed to him that the length of time might be much shortened, and he would therefore give a more severe treatment with longer exposure. He tells his patient that he expects to produce a dermatitis and there has been no complaint from any of them. During the erythema he has found ointment, unguentum asepticol, most satisfactory.

Dr. T. C. Ball of Decatur was called upon. He said that he had intended to be a very close listener, but not to speak on the paper. However, he was struck with the great caution of the speaker. Early in his practice he had great temerity in the use of the X-ray. He had only a few cases of acne and these were very slow in improving until a dermatitis was produced, when the change was brought about quickly. When using the X-ray he is careful to protect the parts not treated. He had had no serious X-ray burns, although it was his custom to push the treatment until he got a mild reaction.

In the treatment of superfluous hair he combined the X-ray with a needle. Downy hairs he removed with the X-ray and the coarse ones with electrolysis. He had had no experience in the treatment of blackheads and had referred several cases to other men. He could therefore make use of the suggestions in his practice.

Dr. Neiswanger said he had known three or four cases of superfluous hair which had been successfully removed by the X-ray. He had had one case, a girl of 24, who had answered some advertisements concerning a remedy for superfluous hairs. She had what appeared a piece of pumice stone, which she rubbed on her face, and this took off all the hairs. They, however, grew out in a few days and the action seemed to be that of a dry shave. Finally she developed a heavy stubby beard. In such a case the use of the needle would be an endless operation. He tried the experiment of pulling out the hairs by the root, thus exposing the hair follicles, and then applied by cataphoresis a one per cent solution of protargol, thus forming in the follicles an insoluble chloride of silver salt. He had never had the opportunity to fully complete his experiments with this method, and he therefore used the X-ray on this case. It took about a year to produce a permanent result. He applied the ray ten minutes daily for about twelve days, or until a mild dermatitis was produced, then he waited a month or so until all reaction had disappeared. This was followed by another course of sittings, with a subsequent intermission. He would thus give about six or eight courses during the year. He found that the hairs came back to a certain extent after each course, but they were more and more attenuated and lighter in color. At last they were so dry and the follicles so atrophied that the hairs appeared more like splinters than true appendages of the skin. He had also used the X-ray in port-wine marks and had noticed that this method had been employed in New York city. Una asserts these marks are due to an overstimulation of the part, and if correct the improvement is no doubt due to the formation of scar tissue, which squeezes out the blood supply. In a very young child these port-wine marks can be removed by pressure alone, employing for this purpose a 5 per cent solution of ichthyol in collodion. In older persons pressure will not remove the mark, but he has had some success in the use of a plaster composed of antimony tartarate, one part; soap plaster, three parts; green soap, one part. The exact technique must be well understood, however, otherwise a scar will result. These wine marks are distinctly benign and one of the common char-

acteristics of this kind of lesion is that when its nourishment is interferred with it retrogrades. Neiswanger has therefore used negative electrolysis with a single needle with a view of cutting off the vascularity, and, while the results have been fairly good, a scar is apt to result.

He believes that the skin is made tighter and that the telangiectases, like all other benign growths, are cut off from nourishment and will atrophy.

He had made the remark frequently that if any one could successfully treat these port-wine stains he would have all the work he could attend to. Patients have been taught that nothing can be done for such disfiguring blemishes, but if they once learn that something can be done for them they will be anxious to try the treatment.

Dr. Neiswanger said that it is true that the hair returned after one course of treatment, but it can be easily removed after a second course, and he felt satisfied that the hair follicles do atrophy when the treatment is given with persistence. At last the hair becomes like a splinter. When the treatments are pushed he had had crusts form on the skin as large as a silver dollar, but these cleared up without any serious sequelae. When a patient would submit to the cataphoric process the result was uniformly successful. In several of his cases he had marked out a space with a lead pencil and had removed all the hairs within that space, as has been stated, and there was no recurrence. The negative galvanic needle will certainly destroy the hair follicles and the skin will not become very sore if care is taken not to remove too many hairs over one area.

Dr. Burdick said that there must be the greatest care taken in the use of ointments on X-ray burns. At present there are several cases in court in which very destructive burns had resulted from the use of ointments on areas of mild erythema, which became destructive burns through the irritation of the ointment. In his practice he had found it necessary to produce burns of considerable intensity and had done so without fear in the treatment of malignant growths where he wished to produce a considerable sloughing of the neoplasm. He had found that it was always best to leave these X-ray burns severely alone. Nature provides the very best kind of a dress-



ing—namely, a thick, heavy, gummy secretion, which thoroughly protects the denuded area. This secretion may be soaked off with hot sterile water, and it will reform in two or three hours. When this secretion disappears by natural process there will be found beneath it healthy granulation tissue. The use of vaseline or petroleum is very dangerous. Whether it contains impurities in the shape of other coal tar products is not known, but it will certainly change a burn consisting of superficial blisters of the second degree into a destructive and sloughing burn of the third degree.

Dr. Burdick always makes it a point to protect the lips in treating the face. One of his patients devised quite an ingenious shield for the lips. She bought a half dozen bangle buttons, which she held between the lips during the treatment. These certainly shielded the lips, for all the tissue surrounding was colored a deep red, leaving the outlines of the buttons as a white area on a pink background.

There is one ointment which can be used with safety, ben-zolated lard, a preference being given to the ointment which has been very little "benzolated." This will not blister, but even this is not as satisfactory as the natural protection.

His method of treating acne was to produce a reaction very early in the treatment severe enough to have this gummy secretion formed, and then allow the reaction to subside. For about two weeks the patient should remain at home, because the face looks something like an attack of smallpox. He produces this condition in eight or ten treatments, using the tube way below the line so that there would be almost no X-rays produced. He then inserts a spark gap of about one quarter inch on each side sufficient to decrease the speed of the cathode stream and produce the desired radiation. The tube must be used, however, with very great caution, because rich chemical rays are then given off.

Referring to Dr. Neiswanger's case, he said that the substance rubbed on the face to remove superfluous hair was half-baked porcelain clay containing barium sulphide. This certainly removes the hair, but it returns very rapidly.

He had found that the X-ray was very satisfactory in the removal of hair, but he had produced considerable irritation to

accomplish this. After the first course of treatment he had found that there was a recurrence of hair in different places, but these could be removed very easily after the second course of treatment.

One of his cases had developed quite a severe burn from the use of white vaseline given by a druggist instead of benzolated lard.

Dr. Grubbe said that he felt that there was too much enthusiasm in this discussion concerning the utility of the X-ray in the treatment of hypertrichosis, and since no one else had spoken of the limitations and disadvantages of the X-ray, he would speak on that side of the question. He believed that the X-ray would be successful in only a few of these cases. He had experienced an extensive X-ray burn on the back of his hand early in his use of the agent, and although there were even yet a few areas of the skin in which marked signs of a so-called precancerous nature existed, the growth of hair in the areas immediately surrounding was not very much interfered with. The treatment will fail in about 90 per cent of brunettes, and these are the ones which come for the treatment of hypertrichosis. The blondes do not seek relief for this only occasionally, and the treatment will cure probably 100 per cent of the blondes. In all those cases where the hair has been removed from the heads of individuals he has yet to see one case where it did not return. He had had considerable experience in his work in such accidental removal of the hair where the work had been done by assistants who had not been careful in the use of the protective screen, but the hair uniformly returned in from three to six months and often the growth was then more luxuriant than before. He therefore never recommends the X-ray for the removal of hair, for he has found that the hair follicles do not atrophy.

Chemical galvanism is very good in such cases, but it is not ideal, for he doubts if 50 per cent remain permanently free. Moreover, it is not a painless treatment. In fact, there is no really successful treatment for hypertrichosis.

As to the use of the X-rays in acne, he believes that the reaction should not be carried beyond a mild dermatitis.

If a more severe reaction is produced it is better not to use

any ointment, because the danger of infection is great and nature takes care of the burn very well. He had tried ointments of various kinds, some of them proprietary and some of his own make. He had found in his own case that the best ointment was sterile peanut oil. It should be scented with a few drops of oil peppermint to the ounce of the peanut oil. This oil is absorbed readily, for it is a natural food, as is cod-liver oil. Friction should be used to rub it in if the parts can stand it.

Dr. Eberhart in closing said that one of his cases of acne whom he had treated for some time had gone north to Duluth and had hunted up a hospital in which the X-ray had been used for diagnostic purposes, but the operator said that he had had no experience in the treatment of acne. The patient, however, wanted the treatments, because she had been obliged to leave Chicago before quite completing her cure. No lead foil was used and the treatments were pushed with a good deal of power. After eight or ten treatments she lost her eye lashes, eyebrows and nearly all the hair from the front of her head, which after a time grew in, but it was not a very pleasant incident, either for the patient or the operator. The knowledge of a few such cases had made him cautious in treatment and most of his patients were willing to take a greater length of time. When the treatments are being forced it is difficult to regulate them with precision. He had received a letter from a doctor inclosing one from a patient blaming that doctor for the terrible condition in which her face had been left by a treatment given by the doctor, which had also served to make him cautious.

Dr. Eberhart believes that a dermatitis indicates a little over-dosage of the X-ray and should be unnecessary, unless it is given with the purpose of destroying tissue. Just as in the use of strychnine we give the drug until there is some slight twitching of the muscles, showing the beginning of a toxic condition from the drug, so he considers that the X-ray dermatitis exhibits a toxic effect of the rays.

## ULTRA-VIOLET-RAY BURNS OF EYE.

By A. W. COLCORD, M. D., Clairton, Pa.

An arc of 1,500 amperes with a voltage of 250 was used to melt a hole through a pig iron plate. The positive pole was grounded on the iron plate and the negative connected with a carbon 2 inches in diameter and 2 feet long, attached to a 16-foot wooden handle. When held 2 or 3 inches away from the iron a powerful arc was formed with great light and heat. With this a 6-inch hole was melted through a 3-foot iron plate in 8 hours. While using this apparatus the eyes of three of the operators received severe burns. As they were 10 to 15 feet away during the time, where the heat was not great, it is believed that the burns were caused by the ultra-violet rays of the arc light.

Case No. 1. About 6 hours after exposure he had dimness of vision. In another hour there was swelling of eyelids, puffing and congestion of conjunctivae, marked photophobia and lachrymation with great pain in eyeballs and burning of conjunctivae.

These symptoms grew worse for 2 or 3 hours, then gradually subsided in 24 hours—all except the dimness of vision, which persisted for two weeks. He was unable to read ordinary print or recognize a friend across the street. As he did not return for treatment during that time I was unable to make an examination of retina, but I am of the opinion that the dimness of vision was due to a retinitis.

There was also in his case a burn of first degree of whole face with peeling of epidermis on the day after, as in sunburn.

Case No. 2. Same general symptoms as in No. 1, but more pain, requiring three-quarter grain morphine hypodermically. There was here some dimness of vision, subsiding in a day or two.

Case No. 3. Similar to others, though recovering completely in two days.

The treatment of all was rest in bed in a darkened room. Cocaine in 2 per cent solution was tried but failed to afford much relief from pain and burning. On all of the cases an ointment composed of 1 grain of bichloride of mercury to

5 ounces of sterilized vaseline was put into eye. This ointment has been used for some time on all our cases of ordinary burns of conjunctiva or cornea with excellent results. Yet in these cases it proved very irritating and was discarded. Patients seemed to get most relief from application of sweet cream from cow's milk, and from cold compresses of boric acid solution.

From the fact that red glass does not transmit ultra-violet rays, it is suggested that operators using this apparatus should wear large, thick red glasses. Attention is called to the following peculiar features of these cases:

1. The extremely high candle power of this arc light, estimated by our electrician at 480,000 or 300 times as strong as an ordinary street lamp.
2. Length of time elapsing from time of exposure till effects of burn are felt—longer than an ordinary burn—shorter than an X-ray burn.
3. Pain and burning out of all proportion to visible signs of inflammation.
4. Failure of the remedies used in an ordinary burn of eye.
5. Tendency to rapid and complete recovery without scarring or other permanent after effects.

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#### INACCURACY IN THE DIAGNOSIS OF MALIGNANT GROWTHS.

The following editorial of Dr. J. Hall-Edwards in the Archives of the Roentgen Ray is so valuable that we gladly give it place as an abstract:

"In the interesting account of the American X-Ray Conference, published in this issue, it is to us curious that of the many diseases treated (with more or less success), lupus vulgaris is placed first upon the list, and rodent ulcer fourth; whilst epithelioma is given the second place. On viewing a large number of photographs reproduced in the American medical journals, we feel that many cases reported as epithelioma, appear to be cases of rodent ulcer. We freely admit the difficulties which have to be encountered in making a true

diagnosis. We are, to a large extent, in the hands of the pathologist, who proves his inability to diagnose from microscopical examination, by his requiring the clinical history of the case before he is willing to give an opinion; and frequently the clinical and pathological appearances do not coincide. In a case which has recently come under our observation the surgeons refuse to give a positive diagnosis, and the pathologist is at sea. In such a case what are we to do? If we treat it successfully we shall be told it was a case of rodent ulcer. If unsuccessfully, it is something else. The history of the case should, of course, help us considerably in arriving at a conclusion, quite apart from either clinical appearances or pathological facts; but inasmuch as in seven cases out of ten the history (as given by the patient) is not to be relied upon, we are left in the dark.

"In admitting our inability to arrive at scientific conclusions, we admit our want of knowledge. We do admit it, and are not ashamed to say so. Our American brothers appear to arrive at conclusions in a manner which is foreign to us. In numerous articles, which have come under our notice, hundreds of cases of epithelioma have been cured by the application of the X-rays. No mention is made of a microscopic examination, and the notes published are so meager that they are absolutely unconvincing. We do not wish to convey the idea that the diagnoses are wrong, but we should like to know how the conclusions are arrived at. In typical cases there is no difficulty in making a diagnosis; but few cases are typical. In many cases there are undoubtedly present conditions which so modify the course of a disease as to render it almost unrecognizable. The presence of syphilis undoubtedly modifies many of these conditions, and unless the notes of published cases are full and complete they are next to valueless. We feel that at the present time there is a pressing necessity for the publication of cases in which a positive diagnosis has been arrived at. We ask such of our readers, who are engaged in the treatment of disease, to send us full and complete notes of any cases they have treated, with or without success."

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## Editorial.

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For the last few months the American X-Ray Journal has been printing the program of a new organization, the American Electro-Medical Society. We have received a letter from the secretary asking us to publish a similar notice. His letter claimed that they had enrolled 150 members. The society is to have its first annual meeting December 1, 2, 3, at Masonic Temple, Chicago.

The program is not very definite, simply giving a list of those who are to read papers. The list includes about 33 names, and if all were to respond it would be a very full program. The fact that a number of these electro-theraputists are also members of the American Roentgen Ray Society led us to be somewhat suspicious of the authenticity of the list and we have personally written to several of these. In every case they reported that they would not give a paper before the American Electro-Medical Society and a few said that they had no intention of becoming connected with this organization. We cannot understand what is the plan behind such inaccurate statements. Out of the list of 33, we have received positive statements from all we wrote to, namely 10, that they had no intention of appearing before the meeting. We imagine it would be somewhat difficult to satisfactorily explain such facts to physicians who have come several hundred miles. No amount of excuses or statements that nearly a third on the list were too sick to appear or send their papers would be satisfactory, but we have no doubt that the journal which is pushing this meeting will be able to give some kind of excuse. It is merely our purpose to state the facts so that nobody will come to such a meeting under false promises.

We do not doubt that some of those on the program are bona fide members of the society and will give papers. We believe that they will repudiate such unprofessional dodges, worthy only the scheming of a petty politician.

**REDUCED FARE TO THE MEETING OF THE  
AMERICAN ROENTGEN RAY SOCIETY IN  
PHILADELPHIA, DECEMBER 9 AND 10.**

The usual reduced rate of  $1\frac{1}{3}$  fare for the round trip, can be secured for the meeting of the American Roentgen Ray Society, which takes place in Philadelphia, December 9 and 10.

All who are planning to go via Chicago, will help to swell the number by sending their names to the Era.

On the next page will be found the program for the annual meeting of the American Roentgen Ray Society, which is to be held in Philadelphia, December 9 and 10. It promises to be a meeting of great practical value because the methods of treatment and of radiography are to be discussed. This free discussion shows that the application of the ray has advanced beyond the purely empirical period of its development. The meeting will do much to educate the profession in the most improved technique.

**NOTICE.**

The next meeting of the Chicago Electro-Medical Society will be held on Tuesday, Nov. 24, on the fourth floor of the Atlas Building, at 8:15 p. m. A demonstration of the Oudin resonator will be given by Mr. John McIntosh. There will be an election of officers for the ensuing year.

C. H. TREADWELL, Secretary.

**MINUTES OF THE CHICAGO ELECTRO-MEDICAL  
SOCIETY.**

The regular meeting of the Chicago Electro-Medical Society was held October 27, 1903, Room 301, Schiller Building, with Dr. Burdick in the chair. Minutes of the previous meeting read and accepted.

It was moved and carried that arrangements should be made, if possible, that the society should meet in the auditorium of the Illinois School of Electro-Therapeutics and that the secretary be authorized to make the negotiations.

A paper was then read by Dr. Eberhart entitled "The X-Ray as a Beautifier." The paper was discussed by Drs. Boomer, T. C. Ball of Decatur, Ill.; Neiswanger, Grubbe and Burdick.

The society then adjourned.

C. H. TREADWELL, Secretary.



PRELIMINARY PROGRAM AND ANNOUNCEMENT  
OF THE FOURTH ANNUAL MEETING OF THE  
AMERICAN ROENTGEN RAY SOCIETY.

To Be Held at the University of Pennsylvania, Philadelphia,  
Dec. 9 and 10, 1903.

1. President's Address, by Prof. Arthur W. Goodspeed,  
Ph. D., Philadelphia, Pa.

2. Pathologic Changes in Tissue Under the Influence of  
the X-Ray, by William S. Newcomet, M. D., Philadelphia, Pa.

Discussion to be opened by Seabury W. Allen, M. D., Bos-  
ton, Mass.

3. The Results of the Roentgen Method in the Diagnosis of  
Renal Calculus, by Charles Lester Leonard, M. D., Philadel-  
phia, Pa.

Discussion to be opened by James B. Bullitt, M. D., Louis-  
ville, Ky.

4. Two Cases of Severe X-Ray Necrosis, Presenting Some  
Unusual Features, by Clarence Edward Skinner, M. D., New  
Haven, Conn.

Discussion to be opened by J. N. Scott, M. D., Kansas City,  
Mo.

5. Skiagraphy of the Chest, by Henry Hulst, M. D., Grand  
Rapids, Mich.

6. How to Obtain an Instantaneous Skiagraph of the  
Thorax, by Mihran K. Kassabian, M. D., Philadelphia, Pa.

Discussion upon the above two papers to be opened by Gor-  
don G. Burdick, M. D., Chicago, Ill.

7. The Development of the Skeleton, Radiographically  
Considered (Lantern Slides), by Preston M. Hickey, M. D.,  
Detroit, Mich.

Discussion to be opened by G. P. Girdwood, M. D., Mon-  
treal, Canada.

8. The Therapeutic Effects of the X-Ray, as Shown from  
the Results of Treatment of One Hundred Cases, by Henry  
K. Pancoast, M. D., Harvey Bartle, M. D., and Mr. Henry C.  
Welker, Philadelphia, Pa.

Discussion to be opened by Emil H. Grubbé, M. D., Chi-  
cago, Ill.

9. The Roentgen Ray Diagnosis of Obscure Diseases, by Russell H. Boggs, M. D., Pittsburgh, Pa.

Discussion to be opened by J. D. Gibson, M. D., Birmingham, Ala.

10. Dangers of the X-Ray Operator, by John T. Pitkin, M. D., Buffalo, N. Y.

Discussion to be opened by Weston A. Price, D. D. S., Cleveland, Ohio.

11. Developers, by Gordon G. Burdick, M. D., Chicago, Ill.

Discussion to be opened by Mihran K. Kassabian, M. D., Philadelphia, Pa.

12. A Comparative Study of Fractures of the Extremities, by Martin I. Wilbert, Philadelphia, Pa.

Discussion to be opened by Russell H. Boggs, M. D., Pittsburgh, Pa.

13. Technique for Making Good Dental Skiagraphs, by Weston A. Price, D. D. S., Cleveland, Ohio.

Discussion to be opened by Levitt E. Custer, D. D. S., Dayton, Ohio.

14. Care and Use of the Static Machine, by Henry E. Waite, M. D., New York, N. Y.

Discussion to be opened by Walter W. Johnson, M. D., Rochester, N. Y.

15. The Stereoscope in Radiography, by E. W. Caldwell, New York, N. Y.

16. The Influence of the Roentgen Ray Upon the Blood of Normal Individuals (an Experimental Study), by William Krauss, M. D., Memphis, Tenn.

17. Exploding Tubes, by Henry K. Pancoast, Philadelphia, Pa.

18. Treatment of Lupus and Epithelioma by the Combined Use of the X-Ray and Ultra-Violet Light, by J. N. Scott, M. D., Kansas City, Mo.



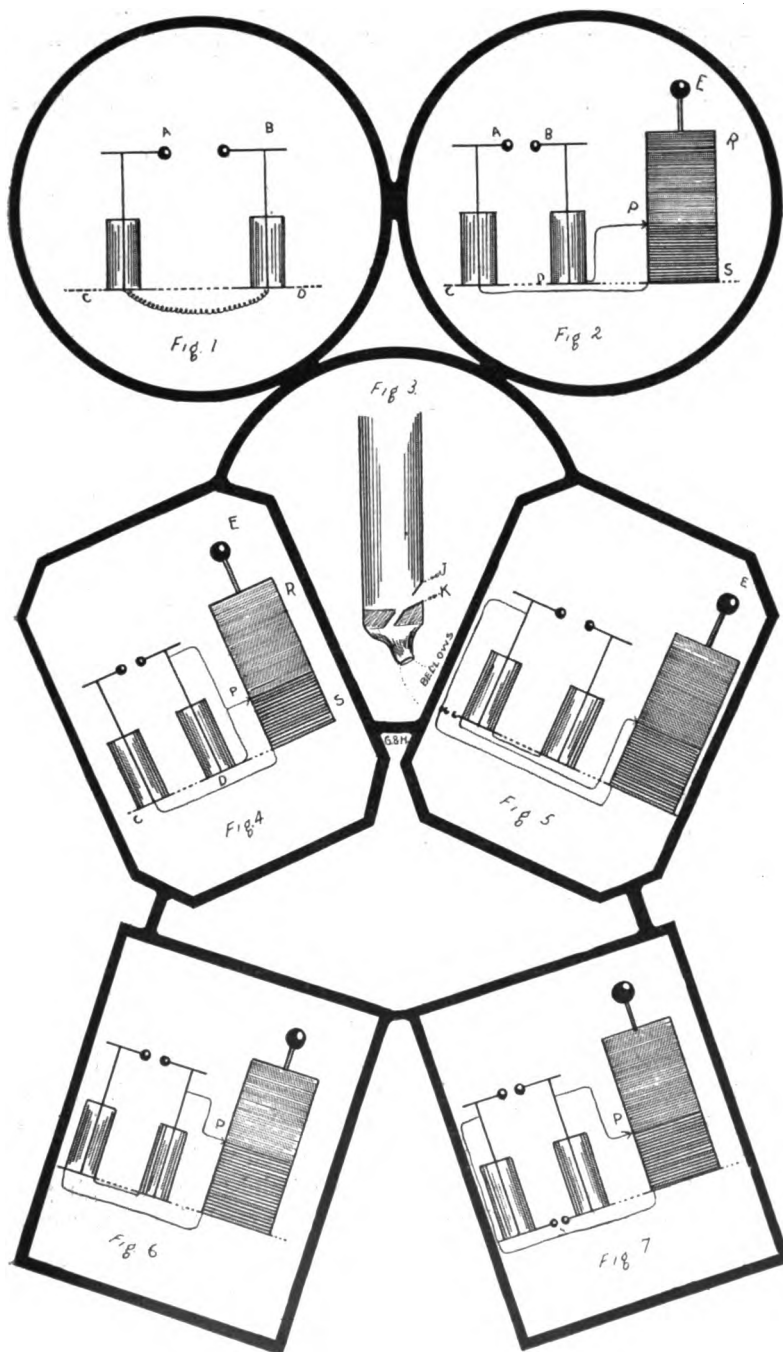
## EXPERIMENTS WITH A D'ARSONVAL HIGH FREQUENCY APPARATUS.

An interesting paper was read before the British Electro-Therapeutic Society in May, and published in *Medical Electrology and Radiology*. The author of the paper, Dr. Manders, has done a good deal of experimental work in modifying the various connections of the d'Arsonval apparatus to the coil or static machine. This apparatus is just coming into use here, although in France and England it has been used extensively.

The d'Arsonval or Ouidin apparatus consists essentially of an impedance coil I placed between the two outer coats of two Leyden jars. (See Fig. 1.) The inner coats of these jars are connected either to the discharge rods of a static machine or induction coil. A and B are the discharge balls, connected in the inner coats of the Leyden jars C D; the outer coats of which are connected by the solenoid S.

In actual practice (see Fig. 2) a part of this solenoid is of large copper wire about size No. 8 and this is wound on the lower part of a wooden cylinder of diameter about 10 inches. The lower end of this wire is permanently attached to the outer coat of one of the Leyden jars. A movable contact connects the outer coat of the other Leyden jar with the solenoid. This contact is moved until the maximum resonance is obtained. To the upper end of this coarse wire S is attached a finer wire, about No. 18, which is wound around the same wooden cylinder and has about 30 turns. The upper end of this small wire is attached to a ball E, to which can be connected a vacuum tube high frequency electrode. Thus we see there are two coils of wire in series upon this vertical cylinder. Christolm Williams in his excellent treatise on the use of high frequency current, says that the patient may be connected by suitable electrodes, to either the coarse wire or to the end of the fine wire. If, however, a vacuum tube electrode is used, it is always attached to the upper end of the finer solenoid.

Mander found that when this movable contact of the jar D to the lower solenoid was so adjusted that the maximum brush at E resulted, the apparatus would give a maximum brush for any spark gap between the discharge balls of the coil or static machine. This is an important point in the treatment, for it



means that this adjustment can be determined for the given machine and not vary much from day to day. In the arrangement of the apparatus, as shown by Dr. Manders, the outside coat of the Leyden jar A was connected with the earth. This connection is however not necessary.

It is important to state that the powerful effluvia is due to resonance. That is, there must be a definite relation between the size of the jar, the shunt S and the length of the wire on the resonator R. If the wire of this resonator is only a foot longer or shorter than what corresponds to the capacity of the jars, only very feeble sparks can be obtained from the knob B, even though the sliding contact F is moved to different parts of the shunt S.

In order to understand the production of this high potential, high frequency discharge it is necessary to digress a moment to the phenomena of resonance, exhibited in other departments of physics. The most obvious example of resonance is the reinforcement of sound by columns of air. For instance, an organ pipe, Fig. 3, is usually a narrow, cylindrical, hollow tube. The lower part of this tube is closed, excepting that there is a small vertical slit K through which is blown a blast of air from the organ bellows. This blast strikes against the wood wedge J and makes a very feeble sound, and would be such a one as is produced when the breath is blown violently across a knife edge. The sound, if any, would not be clear and would probably be of high pitch. The column of air, however, is able to vibrate to a certain note, and it picks out this vibration from the irregular flutter produced by the wind blowing across this wedge. By resonance, the full clear tone of the organ pipe is produced. Change the size of the pipe and its length, that is, change the dimensions of the air column, and the tone changes.

What we have just seen to be true in sound vibration is also true in high potential and high frequency discharges. The length and the size of the shunt and rheostat correspond to the dimensions of the air column; the energizing spark of the static machine or coil corresponds to the flutter of air produced by the wind blown against the wood wedge.

Before learning the technique of administering a high potential and high frequency current, one ought to perform a

number of experiments with the apparatus, because one will then have a clear idea of the way these currents are generated and will therefore have more confidence in their administration.

I therefore connected up the apparatus in the manner suggested by Dr. Manders and have fully corroborated his results

#### ARRANGEMENT 2.

The sliding point P was connected alternately to the outer and inner coats of jar D. It was proved that the brush at E and at P are greater when the upper end of the solenoid S is in contact with the outer coat. (See Fig. 4.) This was determined by placing the hand near S at point P, and the effluvia from point E was also determined in a similar way.

#### ARRANGEMENT 3.

The two outer coats of the jars are connected together. Sliding contact connected to outer coat of one jar. Low potential end of solenoid connected to inner coat of same jar. Spark gap at G as shown in Fig. 5. Result: Intensely livid, greenish spark of considerable thickness at E. No brush.

#### ARRANGEMENT 4.

The outer coats of jars connected together. Sliding contact to inner coat of right jar (see Fig. 6). Low potential end of resonator R connected to outer coat of other jar. Result: Very feeble effects.

#### ARRANGEMENT 5.

Spark gap between the two outer coats of jars. Permanent contact of shunt S connected to inner coat of one jar; sliding contact connected tin inner coat of other jar. Thus the d'Arsonval arrangement is reversed. This gave about the same amount of brush as the direct arrangement d'Arsonval. (Fig. 7).

It is unfortunate that practically all the application of the high potential and high frequency currents is limited to the treatment through vacuum electrodes. But one would certainly judge that this is the case from reading reports in our medical journals. The French and English operators make use of the current in a number of ways. For instance, Chrisholm Williams, in his admirable treatise, shows how the effluvia can be administered by a sharp-pointed electrode pro-

ducing a spray very different from the static spray. He also shows that the patient can be connected by two electrodes to the solenoid S and a considerable milliamperage can be sent through the patient's body without any unpleasant sensation. The amperage can be registered by a specially constructed milliamperemeter or its considerable amount indicated by the fact that if an incandescent electric light bulb is put into the patient's circuit the lamp will glow out with great brilliancy.

I shall not speak of the special vacuum electrodes by which the different natural cavities of the body may be treated. Very little work has been published in our journals on the value of these electrodes. Williams is quite enthusiastic over his results.

A sharp distinction is drawn between the resonance apparatus and the Tesla coil which are in quite common use in this country. European writers call these coils hyper-static and claim that the d'Arsonval apparatus is superior. This point will only be proved after a wide test of the respective apparatus. In closing it is interesting to note that both French and English writers acknowledge the value of Morton's early work in this field. By including his patient in circuit between the outer coats of the jars, Morton was the first one to use therapeutically, oscillatory discharges of high potential.

C. H. TREADWELL, B.S., Chicago.

## ELECTRICITY IN THE TREATMENT OF CHRONIC DYSPEPSIA.

By Otto Juettner, M. D., Ph. D., Professor of Principles and Practice of Physiological Therapeutics in the Cincinnati Post-Graduate School of Physiological Therapeutics.

The form of chronic dyspepsia which is peculiarly adapted to electro-therapeutic treatment and usually yields satisfactory results, both as far as the relief of symptoms and ultimate curative effects are concerned, is the so-called dilatation (atony) of the stomach. From a diagnostic point of view there is hardly a chronic ailment which is so frequently mistaken—clinically there is certainly none that is as common as

this bugbear of the general practitioner. In the whole domain of internal medicine I know of no subject which rewards careful and painstaking study as promptly and richly as the management of dilatation of the stomach. If we remember that 75 per cent of all chronic diseases are traceable to perverted or partially suspended function of the stomach and bowels and that out of this number by far the greatest proportion are cases of catarrhal, dilated stomach, we are prepared to recognize the clinical importance of our subject. Nearly all cases of so-called chronic dyspepsia or catarrh of the stomach are cases of variable degrees of gastric dilatation. From the large number of cases which it has been my good fortune to observe and treat, I am tempted to use the terms "catarrh of the stomach," "chronic dyspepsia" and "gastric dilatation" synonymously, the true relation being that of pathological condition, symptom and effect. This effect is an actual organic change in the structure of the walls of the stomach, a thinning of its muscular coat, a reduction in the digestive, peristaltic and contractile power of the organ, an increase in its capacity and a deviation from its normal anatomical position. We can readily understand that such a condition must be followed by evidences of malnutrition in a variety of ways. The nervous system usually suffers more than any other anatomical and physiological part of the organism, giving rise to that unlimited number and unending variety of reflex symptoms which usually draw the attention of the physician away from the real seat and source of the trouble and thus pave the way for empirical symptomatic treatment which accomplishes but little more than the giving of partial temporary relief. Insomnia, mental depression, headache, irritability, disturbances of the organs of special sense, of the sensory and motor functions and a host of other symptoms are variously diagnosed and treated, while the dilated stomach remains unsuspected and the patient unrelieved. I venture to state most emphatically, and I have no fear of successful contradiction, that the cure of dilatation of the stomach would mean the cure of over half of all cases of chronic disease of the nervous system. I will go even further than this. The anatomical position of the dilated stomach gives rise to an array of pressure-symptoms which are usually mis-



taken for pathological conditions of sound organs, while they are merely the symptomatic manifestations of gastric dilatation. Palpitation of the heart, precordial distress, dyspnea, backache, numbness in the arms, coldness of the hands, a sense of choking, nervous cough are among these distressing pressure-symptoms. The solar plexus, the "abdominal brain," responds in a variety of ways to the pressure of a dilated stomach. Hallucinations and illusions, spasms, fear of something terrible happening, fear of accident and death, fixed ideas and even insanity are among these symptoms produced by pressure upon the solar plexus. In most of these cases the real cause remains unsuspected. Most of these unfortunate conditions can be relieved because dilatation of the stomach can usually be treated successfully. This is a department of clinical medicine which ought to be invaded by the scientific electro-therapist because electricity has proved itself to be an auxiliary of the greatest value in the management of these unfortunate chronic cases.

It is a good plan in *all* chronic cases, especially in those lingering, ever-complaining, neither altogether well nor exactly sick individuals, to examine the epigastrium. Tenderness over the stomach, together with succussion (splashing noise), elicited by percussion, is a suggestive sign of dilatation. For an examination of this kind the patient should be on his back with knees drawn up and mouth open. If the tongue presents a dirty, grayish or yellowish coating, covering the center and expanding toward the root of the tongue, the evidence is almost conclusive. Anorexia, a capricious appetite and a tendency toward constipation complete the chain of evidence. There may be a kaleidoscopic variety of symptoms suggesting every disease to which human flesh is heir. The physician should not allow his attention to be deflected, but rigorously distinguish between condition and symptom.

That dilatation (atony) of the stomach in most instances is curable is an indisputable fact. The treatment rests upon a tripod, to-wit: Massage, electricity and proper feeding. Additional agents of great value are irrigation of the colon and hygienic measures adapted to the individual case.

The treatment and cure of a case of dilated stomach should

be begun by attempting to regenerate the blood supply of the stomach and contiguous structures. This is the object and effect of *massage*. Incidentally the manipulation of the stomach by the hand of the masseur results in stimulation of the transverse colon, production of peristaltic movement in the large intestines, relief of constipation and stimulation of the solar plexus posteriorly. The *modus operandi* of stomach massage is as follows:

The patient lies on his back with the knees elevated and mouth open. The operator stands on the left side of the patient, placing his right or left hand upon the patient's epigastrium. Deep but gentle pressure with the ball portion of the hand alternates with pressure by the inner surfaces of the four fingers (not the tips of the fingers); at the same time the whole hand of the operator is rocked to and fro, carrying the whole epigastrium with it without sliding over the skin. The operator's hand must at all times remain in firm contact with the skin and carry the skin along. The treatment should last from ten to twenty minutes and be repeated every day or every other day. It should not be given after a meal. To enhance the effect the operator's unengaged hand may hold a metal handle-electrode, while the other electrode is held by the patient's hand. A mild *faradic* current can in this way be allowed to pass through the muscular structure of the patient's abdominal and intestinal walls, the current passing from the operator's engaged hand directly to the patient. The current should be mild and non-irritating. If applied in the way indicated a gentle stimulation of the nutrition of the muscular tissue will be the result. Massage and faradism make an effective combination.

A mild *galvanic* current can also be used with advantage. The negative pole should be applied to the pit of the stomach by means of a sponge-electrode. The nerve supply of the affected region readily responds to this form of galvanization. In suitable cases the galvanic current may be interrupted by means of the rheotome. The interruptions should be slow and rhythmical. The ready response of the nerve tissue to rhythmical stimulation is well known to every well-informed physio-

logical therapist. It is seen in hydro-therapeutic as well as in electro-therapeutic applications.

I have observed some very excellent and characteristic effects following the employment of a bi-polar *high-frequency* current. Two flat vacuum-electrodes are connected with the two poles of a high-frequency coil and placed over the patient's epigastrium and abdomen respectively. A mild current of rapid interruption should be applied, the electrodes being constantly moved about to avoid irritation and blistering of the skin. At times it is of advantage to put one pole on the back, moving it slowly along the median line. I may add here that the high-frequency current from a static machine seems to answer better than the high-tension electric energy generated by a coil.

The negative *static* spray or breeze is an admirable auxiliary agent in the treatment of gastric dilatation. The static spark is disagreeable in its application and harmful in its effects, and should, therefore, be avoided.

The employment of high voltage has recently been given a wider therapeutic scope by the introduction of the *solenoid* (in conjunction with the alternating current) and the *diasolenic* as an attachment to the static machine. If we allow the body of a patient to remain within the magnetic field of a high-voltage current (the so-called "*diasolenic bath*"), the metabolism of the patient's organism is affected in a most emphatic manner. Mild diaphoresis supervenes, followed by a sense of stimulation and buoyancy. Even chronic dyspeptics will experience a slight desire for food after a treatment of this kind. I have been in the habit of administering a treatment of this kind every day or every other day to every dyspeptic or nervous patient for some weeks past and am, as a result of observation, thoroughly impressed with the singular efficacy and the universal applicability of high frequency. In cases of chronic stomach trouble the results are surprising. I am justified in designating this form of electric energy as the most promising of all electro-therapeutic applications in the treatment of these distressing conditions.

In regulating the *diet* of an old chronic case of dilatation it is well to remember that food offends infinitely more by its

bulk than its quality. Food should possess substance, not weight. It would carry me beyond the confines of my subject to add anything more to the discussion of the therapeutic management of dilatation of the stomach. I wish to impress upon my electro-therapeutic brethren the value of manual massage. Every electro-therapist ought to possess the knowledge and skill necessary to give massage successfully in these cases. He can do a world of good and derive an immense amount of material benefit from the management of these chronic conditions, principally by the successful employment of massage and electricity combined.



#### NOTES ON RECENT CLINICS AT THE CHICAGO HOSPITALS.

In an article in the Oklahoma Medical News-Journal Dr. R. H. Tullis, of Lawton, Oklahoma, details some of his observations concerning the work done in the Chicago hospitals. He found that the X-ray was considered of the very highest value as a diagnostic agent. The following paragraph is characteristic:

The deference shown to the X-ray by Senn recalled a meeting of the Chicago Medical Society, which the writer had the pleasure of attending, devoted to a discussion of the possibilities in medicine of that remarkable discovery. At that time its uses appeared so extensive that Senn feared that the day of the skillful diagnostician was passed. That his apprehensions have not been fulfilled all will admit, yet regardless of its many disappointments and misuses the great clinicians are still using it and I think with renewed confidence.



## EFFECTS OF ELECTRIC CURRENTS AND SO-CALLED LIGHT RAYS ON BACTERIA.

The declaration made in a modern text-book that continuous electric currents are bactericidal is one that requires considerable modification inasmuch as it is capable of causing a vast deal of mischief. While the statement may be partially correct, various observers have demonstrated that degree or quantity is a factor which claims recognition in an estimate to determine the bactericidal power of the electric current.

In 1901 Zeit conducted some very thorough experiments by which he demonstrated that bacteria of low thermal death rate were killed by exposure to currents of from two hundred sixty to three hundred twenty milliamperes for ten minutes, but that a current of forty-eight milliamperes has no bactericidal effect, even if continued for two or three hours. On the other hand, currents of one hundred milliamperes will kill non-resisting bacteria "by the production of electrolytic germicidal products" if continued for seventy-five minutes.

Electrodes are rarely sterilized between employments in routine practice; indeed the construction of these appliances is usually such that the only reliable method of sterilization—boiling and steam under pressure—cannot be utilized. In genitourinary work the most essential precaution is to prevent the introduction of septic material into the genitourinary tract. Currents of the strength mentioned are certainly seldom, if ever, applied to the region designated, as only a few milliamperes are required to disrupt a stricture. The irritation produced by electric currents constitutes a focus for infection, which is almost certain to occur if the electrode is not aseptic. Happily this method of treatment is fast being relegated to oblivion.

"The continuous current produced by polarizing electrodes and the exclusion of the effects of ions is neither bactericidal nor antiseptic." Tesla currents also prove negative as regards germicidal properties "when passed around a bacterial suspension within a solenoid." Ozone, when brought in contact in sufficient quantity, destroys bacterial life. The amount necessary to cause death may be obtained from high-frequency coils

or from so-called brush discharges. The X-rays will kill many varieties of bacteria in plate cultures, providing the exposures are continued twenty to thirty minutes. Ultra-violet rays, as is now quite well known, are bactericidal. In the treatment of lupus vulgaris, according to the specifications of Finsen, the patient is subjected to ultra-violet rays for an hour and ten minutes, on successive days, until an apparent cure is effected. The patient is requested to report any manifestations of recurrence of the condition, and the claim is maintained that only one or two per cent of six hundred cases of lupus vulgaris treated at Copenhagen have resulted in failure, the greater number of which were attributable to faulty treatment. —*Editorial Comment in the July Physician and Surgeon.*

#### ARTIFICIAL FLUORESCENCE OF LIVING TISSUES.

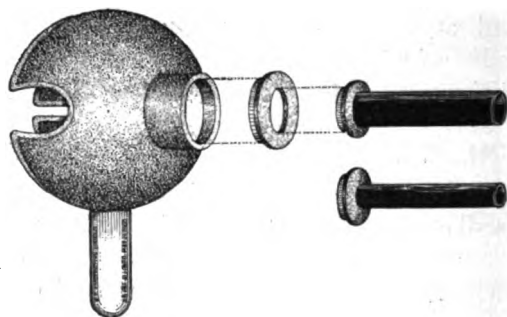
In the New York Electrical World and Engineer Dr. W. J. Morton describes a new method of producing a fluorescence in the blood. X-rays produce a fine, opalescent, violet ray in solution of bisulphate of quinine of the strength of one grain to eight ounces. In a person weighing 130 pounds there are ten pints of blood, and if 20 grains of quinine are in the blood this solution will correspond to the required one for fluorescence. He gives a dose from 5 to 20 grains one hour before the X-ray treatment. The salt is thus present in the tissue treated. The X-rays excite fluorescence of the salt. The violet rays will thus come into direct connection with the tissues wherever the X-rays penetrate, and the curative power of these rays has been attested in numerous instances. Dr. Morton has been treating cancer by this method upward of a year and believes he has attained results more quickly than by the ordinary X-ray treatment. He has also treated pseudo-leukemia and chronic malaria. Radio-therapeutists will watch for further reports with much interest.



## NEW INVENTIONS AND IMPROVEMENTS IN ELECTRO-THERAPEUTIC AND X-RAY APPLIANCES.

We will report on this page from time to time the latest improvements and inventions on Electro-Therapeutic and especially X-ray appliances, thus affording the busy physician, who uses these important agents in his practice, an opportunity to keep in constant touch with the up-to-date manufacturer.

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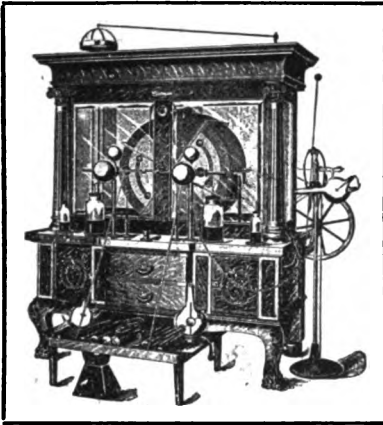
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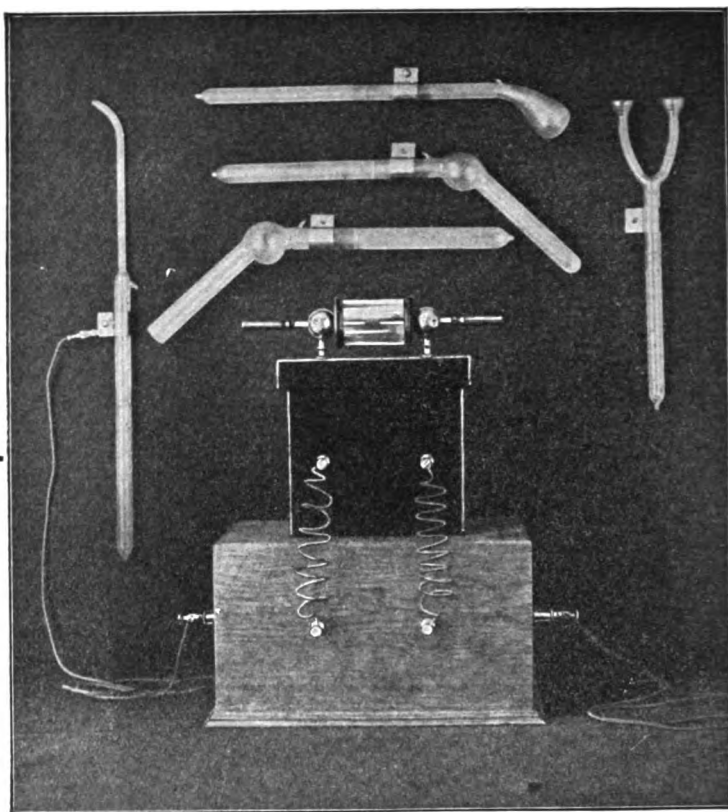
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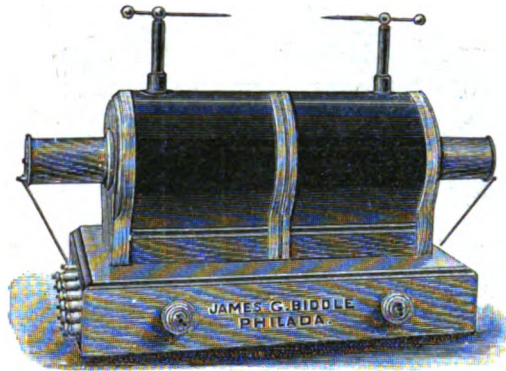
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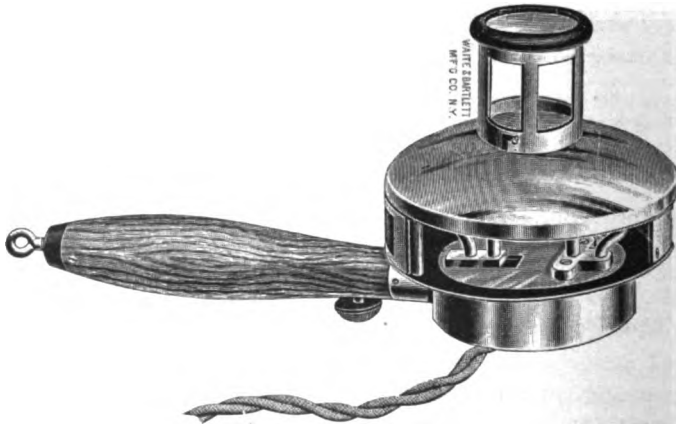
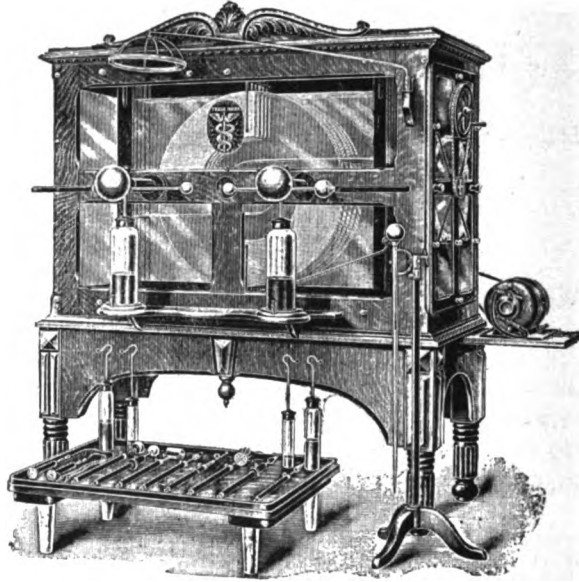
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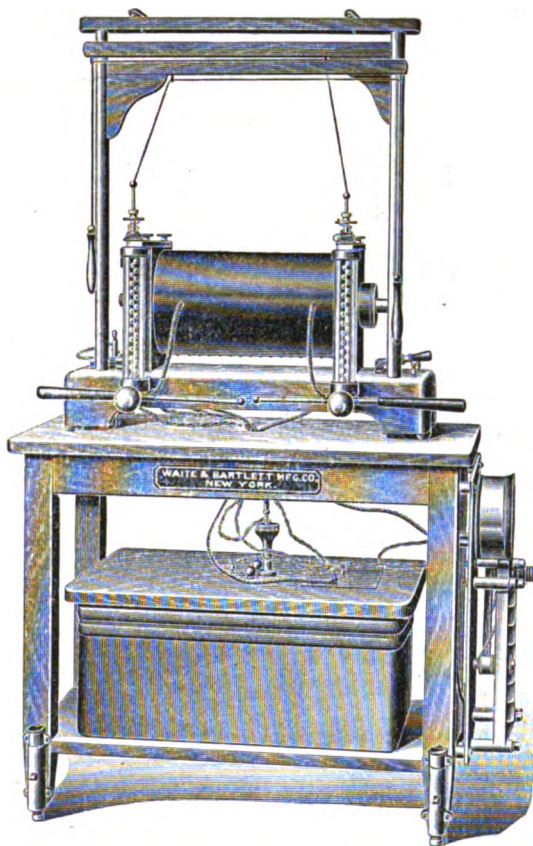
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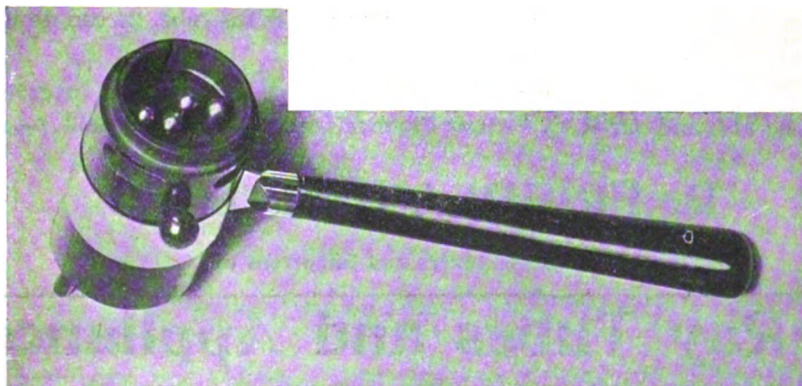
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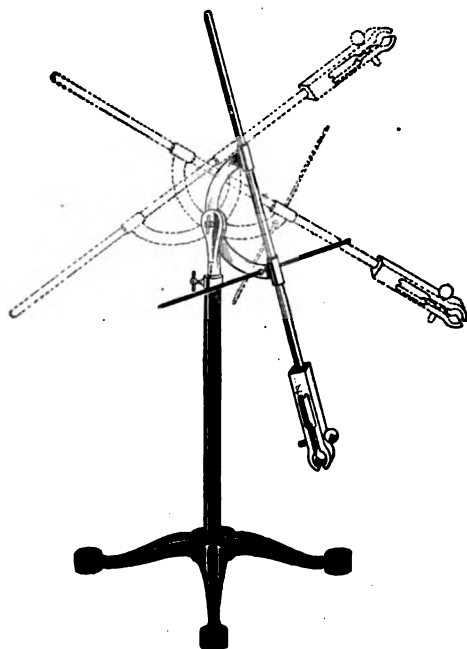


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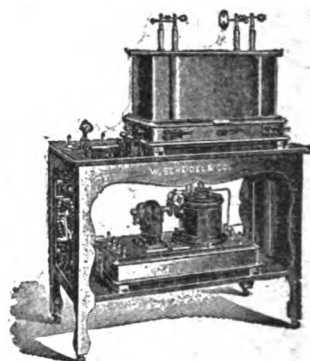
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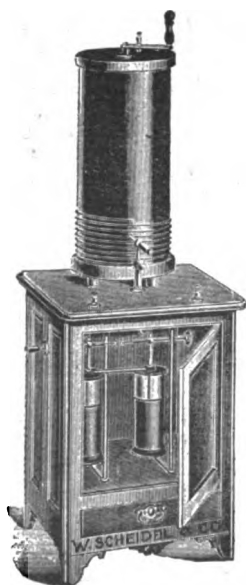
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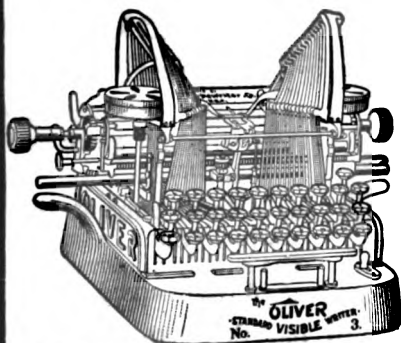
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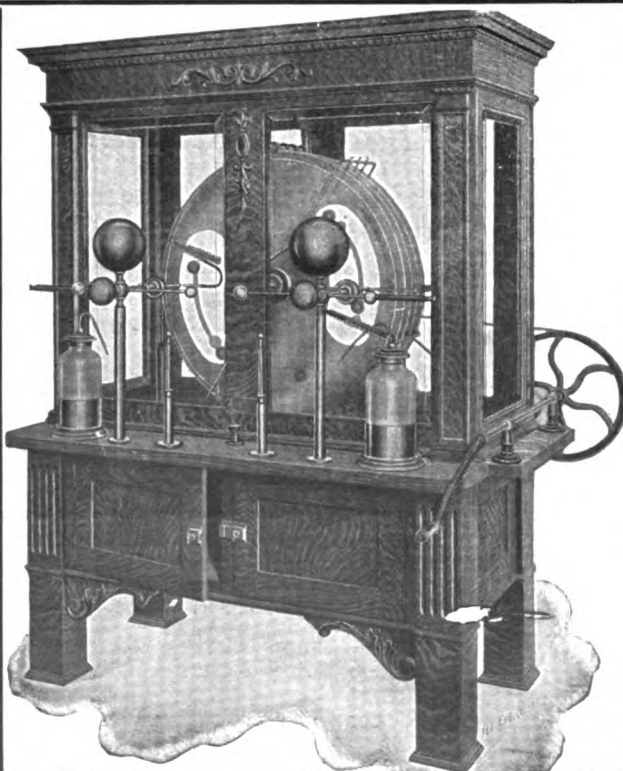
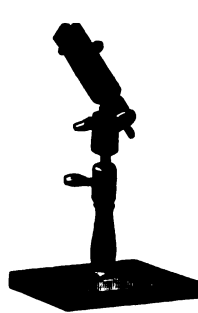
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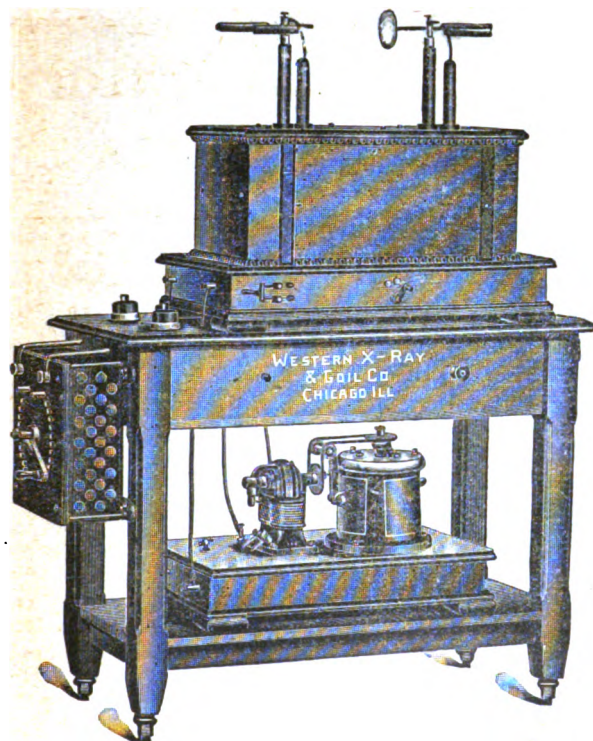
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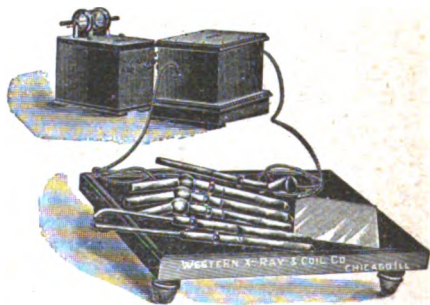
Our **HIGH FREQUENCY OUTFIT** is the best that science and material can create. It gives better results and will also work all the time, and can be used on the static machine as well as on the coil. Price \$50.00. This price includes High Frequency Coil, spark gaps, condenser, metal foot plates, insulated platform, cords and six assorted electrodes.

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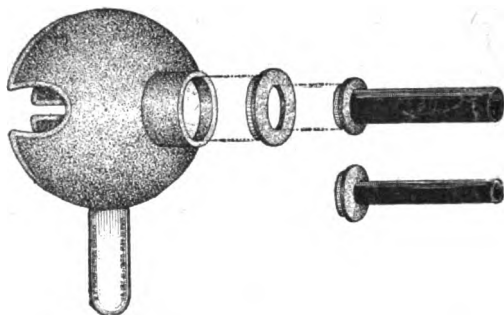
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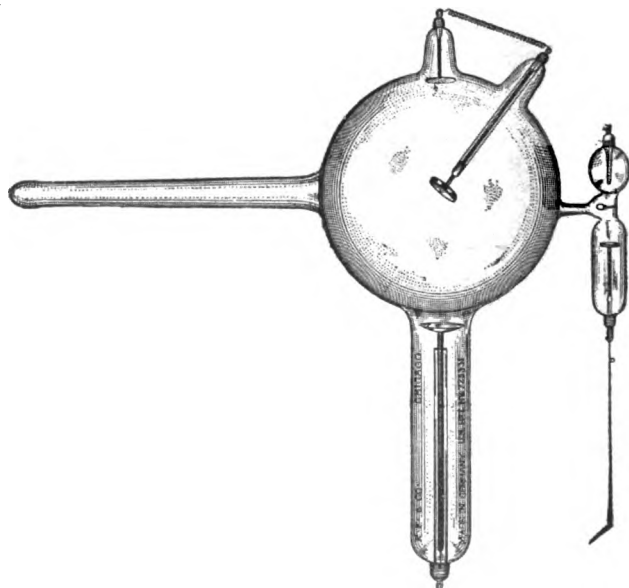
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